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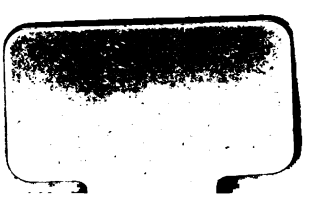

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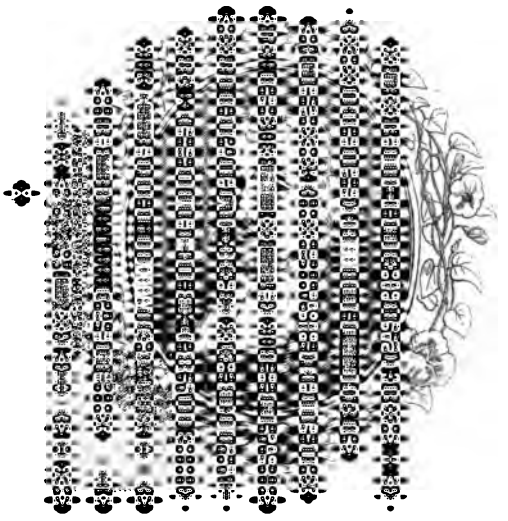

MEMORIALS OF JOHN RAY,

CONSISTING OF

HIS LIFE BY DR. DERHAM;

BIOGRAPHICAL AND CRITICAL NOTICES BY SIR J. E. SMITH,
AND CUVIER AND DUPETIT THOUARS.

WITH

HIS ITINERARIES, ETC.

EDITED BY

EDWIN LANKESTER, M.D. F.R.S. F.L.S.

SECRETARY TO THE RAY SOCIETY.

LONDON:

PRINTED FOR THE RAY SOCIETY.

MDCCCXLVI.

PRINTED BY C. AND J. ADLARD,
BARTHOLOMEW CLOSE.

EDITOR'S PREFACE.

On the establishment of the Ray Society the Council were desirous of commencing their publications, if possible, with a volume commemorative of the great naturalist, under the auspices of whose name the Association had been formed. And although among the great number of his works, it appeared, for various reasons, that no one could be selected for this purpose; still it was felt that an account of the life, together with some critical notice of the labours of Ray, would be highly desirable. The time, however, necessarily required for this object, precluded the possibility of preparing such a work as the first volume to be issued by the Society, and it was also found that an original life of Ray, and a sufficient account of his writings, would demand so much labour, and such pro-

longed research, by an author not only well acquainted with the works of Ray and his contemporaries, but also well versed in the present state of botanical and zoological science, that a longer time would be required than was compatible with the speedy issue of the work. Under these circumstances it was suggested that a volume, comprising the original life of Ray, by Dr. Derham, the biographical notices in Rees's 'Cyclopædia,' by Sir J. E. Smith, and in the 'Biographie Universelle,' by Cuvier and Du Petit Thouars, together with the 'Itineraries,' and such published and unpublished Letters as were accessible would form an interesting volume, and one which would occasion comparatively but little delay. The publication of such a volume having been resolved on, the duty of editing it was committed to me. In the discharge of this duty unforeseen circumstances have prevented the completion of the volume till the present period, but it still forms part of the first year's issue.

In editing this volume I have taken the opportunity of adding a few notes, some of them biographical, others explanatory and natural-historical, which I trust will be found interesting. In preparing the biographical notes I have been guided as to their length by the greater or less connexion the history of the individual has had

with the subject of the volume, and I am myself responsible for all these, except in the cases of Wilkins, Sloane, Oldenburg, and Derham, which are partly or entirely extracted from the 'Penny Cyclopædia.' The notes which appear in the original edition of Dr. Derham's Life of Ray, published by Mr. Scott, are signed G. S.

For the identification of Ray's plants in the 'Itineraries,' for the botanical notes, and the Catalogue of Ray's Works, I am indebted to Mr. Babington of Cambridge; and Mr. Yarrell has supplied the modern names of the birds and fishes. The identification of species and the notes, by Messrs. Babington and Yarrell, are marked by brackets in the text. Mr. Busk has kindly performed the task of translating the notice, already alluded to, by Cuvier and Du Petit Thouars, from the 'Biographie Universelle.' The drawing of the tomb of Ray, and Black Notley Church, forming the frontispiece of the present volume, is from the pencil of Professor Edward Forbes.

During the preparation of this work for the press, I have been offered materials which could only have been satisfactorily made use of in preparing an extended and more complete life of Ray. The Rev. W. L. P.

Garnons, B.D.,* Fellow of Sidney Sussex College, Cambridge, placed in the hands of the Council a manuscript notice of the life and works of Ray, and G. W. Johnson, Esq., of Winchester, who has written an unpublished life of Ray, has likewise offered me his papers, and directed my attention to various sources of information. There is also a manuscript life existing in the library of the Hunterian Museum at Glasgow, and permission was granted by the trustees of that institution to Professor Balfour to render this available. I mention these materials not only to express my obligation to the gentlemen who so liberally placed them at my disposal, but also to direct attention to sources of information which some future biographer may profit by. I think it will scarcely be doubted that a more complete biography of our great countryman is needed, when it is known that the three notices in this volume contain the whole account hitherto given of his life. In such a work he would be shown to be much more than "a learned and judicious compiler," and the importance of the results of his labours might be more clearly and fully vindicated than was consistent with either the design or scope of the present volume.

The extent of the influence of the genius of Ray on the

* B.A. is a misprint at page 8.

science of natural history is far greater than can be estimated by the number or size of the volumes which he wrote, and is to be traced to his habit of acute observation of facts and the logical accuracy with which he arranged them. He made his knowledge of the structure and physiology of plants subservient to a great plan for their arrangement, and this plan, when carefully examined, will be found to contain the fundamental principles of all the more recent scientific systems in natural history, and to have laid the foundation of the views of a natural classification of the vegetable kingdom put forward in later times.

E. L.

22, Old Burlington Street;
February 1846.

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SELECT REMAINS

OF THE LEARNED

JOHN RAY, M.A. F.R.S.

WITH HIS LIFE,

BY THE LATE

WILLIAM DERHAM, D.D. F.R.S.

TO THE RIGHT HONORABLE

THE EARL OF MACCLESFIELD,

PRESIDENT OF THE ROYAL SOCIETY.*

My Lord,

As Mr. Ray was both an eminent Philosopher and a Fellow of the Royal Society, there is no one to whom the following sheets could, with so much propriety, be addressed, as to your Lordship. I will not here, my Lord, attempt an encomium on your Lordship's character, for it would be thought presumption in me to endeavour to do justice to those excellent qualities which so eminently distinguish your Lordship. May you, my Lord, long live an ornament to your country, and to that illustrious body over which you so worthily preside.

I will not, my Lord, make any apology for not giving a more elaborate life of Mr. Ray; I shall only beg leave to assure your Lordship that it now appears as it was left by Dr. Derham,† who even seemed to despair of ever

* Macclesfield, Right Honorable George Parker, second Earl of, was president of the Royal Society from 1750 to 1764, and contributed the following paper to the 'Philosophical Transactions' for 1740: "Remarks on the Solar and the Lunar Years, the cycle of nineteen years, commonly called the Golden Number, the Epact, and the Method of finding the time of Easter, as it is now observed in most parts of Europe." He was a principal promoter of the reformation of the Calendar, and made a speech on this subject in the House of Lords, which was afterwards published. He died in 1766.

† Derham, the Reverend William, D.D., was born at Stowton, near Worcester, in November 1657, and received his early education at Blockley in the same county. He was admitted of Trinity College, Oxford, in 1675. Having completed his academic studies, he was ordained, and in 1685 was

putting it into its present dress, if we may judge by what he says on this subject in his preface to the Collection of Philosophical Letters between Mr. Ray and his

instituted in the vicarage of Wargrave in Berkshire; and four years afterwards, to the valuable rectory of Upminster in Essex, where he spent the remainder of his life. To this residence he was much attached, mainly because it gave him, by its contiguity to London, ample opportunities of associating with the scientific men of the metropolis. He was made canon of Windsor in 1716, and in 1730 he received from his university the diploma of D.D.

He devoted his attention, with great earnestness, to natural and experimental philosophy. He was enrolled a member of the Royal Society, and he contributed a considerable number of memoirs to its Transactions. These papers prove him to have been a man of indefatigable research and careful observation.

His first publication was the 'Artificial Clock-Maker,' which has gone through three or four editions, and is considered a useful manual even now. In 1711, 1712, and 1714, he preached those sermons at Boyle's Lecture which he afterwards expanded into the well-known works 'Physico-Theology' and 'Astro-Theology,' or a demonstration of the being and attributes of God from the works of creation and a survey of the heavens, enriched with valuable notes, and good engravings after drawings of his own. His next separate work was 'Christo-Theology,' or a demonstration of the divine authority of the Christian religion, being the substance of a sermon preached in the Abbey Church of Bath, in 1729. His last published work of his own was entitled 'A Defence of the Church's Right in Leasehold Estates,' written in answer to a work entitled 'An Inquiry into the Customary Estates and Tenant-rights of those who hold lands of the Church and other Foundations.' It was published in the name of Everard Fleetwood.

Dr. Derham also wrote a life and published some letters of the naturalist Ray, of which he had procured the MSS., and to him the world is indebted for the publication of the philosophical experiments of Dr. Hook. He also gave new editions of other of Ray's works, with valuable additions, original, and from the author's manuscripts, besides editing other works of value, amongst which was the 'Miscellanea Curiosa,' in 3 vols. small 8vo, a work of value even at this time.

A considerable number of his papers were printed in the 'Philosophical Transactions,' from the 20th to the 39th volume inclusive, the principal of which are:—1, Experiments on Pendulums in vacuo; 2, Of an Instrument for finding the Meridian; 3, Experiments and Observations on the Motion of Sound; 4, On the Migration of Birds; 5, On the Spots on the Sun from 1703 to 1711; 6, Observations on the Northern Lights, October 8th, 1726, and October 13th, 1728; 7, Tables of the Eclipses of Jupiter's Satellites; 8, Difference of Time in the Meridian of different places; 9, On the Meteor called Ignis Fatuus; 10, The History of the Death-watch; 11, Meteorological Tables for several years.

Dr. Derham was of an ungainly appearance, small stature, and distorted form. He was not only the moral and religious benefactor of his parishioners, and of all those who came in his way, but he was likewise the physician of their bodies, and their pecuniary friend in all their difficulties. He lived beloved, and died lamented, at his rectory, in 1735, aged seventy-eight.

ingenious correspondents; where he observes, that notwithstanding he had made a considerable progress in his Life, yet he was afraid he should scarce be able to accomplish what he intended, as he had much less leisure at that time than when he undertook that work.

The three letters from Mr. Ray to Dr. Derham are not, my Lord, in the collection just mentioned; I have therefore given them a place among the remains, which I hope is done with the more propriety, as they have some reference to Mr. Ray's life.*

The Itineraries, my Lord, are in Mr. Ray's own handwriting; and as no one was ever more accurate in his observations than he was, I thought it would not be right to keep them any longer from the public, especially as I have letters by me from some eminent persons to Dr. Derham, earnestly pressing the publication of them. Permit me now, my Lord, to offer them, with the other remains of Mr. Ray, to the public, under your Lordship's protection, and to subscribe myself, my Lord,

Your Lordship's most obedient, humble servant,

GEORGE SCOTT.†

* Ray's letters are arranged chronologically in this work. Those alluded to in the text are dated May 8th, 1702; March 31st, 1703; August 16th, 1704.

† Of George Scott I can find no satisfactory information. He appears to have been a friend of Dr. Derham's; and the notes which are signed G. S., and which are found in the original edition of Ray's Life by Derham, are undoubtedly his. In Watt's 'Bibliotheca Britannica' there is a George Lewis Scott, F.R. A.S.S., mentioned as a gentleman of considerable talents and general learning. He was born at Hanover, of Scottish parents, and died in 1780.

SELECT REMAINS AND LIFE OF RAY,

BY

WILLIAM DERHAM, D.D. F.R.S.

Mr. John Ray, the subject of the following Life, was the son of Roger Ray and Elizabeth his wife, of Black Notley, near Braintree, in Essex. He was born November 29th, 1628,* and was bred a scholar at Braintree School, under one Mr. Love, the master thereof, where he made such proficiency (although at that time no good school, which Mr. Ray used sometimes to lament, as a great misfortune to his younger years,) that before he arrived at the age of sixteen he was sent to the University of Cambridge, and entered at Catherine Hall, on June 28th, 1644, under the tuition of Mr. Duckfield.

Here he continued about a year and three quarters, and then removed to Trinity College; but for what reason, or by what means, I cannot tell; only I find he was afterwards much pleased therewith, because in Catherine Hall they chiefly addicted themselves to disputations, but in Trinity the politer arts and sciences were principally minded and cultivated.

* In a MS. notice of Ray and his works, by the Rev. W. L. P. Garnons, B.A. of Sidney College, Cambridge, with the use of which I have been favoured, he states that although the 29th of November is usually regarded as the birthday of Ray, that on "searching the parish registers" it was discovered that "he was baptized on the 29th of June, 1628; consequently the above date, as the supposed one of his birth, is incorrect."

When he was come to Trinity College, he had the happiness to have Dr. Duport* for his tutor,—a man well known for his learning, particularly for his great skill in Greek, which he gave the world good proof of, in his Homerical Translations of Job and the other Hagiographa.

Under this learned tutor, Mr. Ray so closely applied himself to his studies, that what he missed of at Braintree school, he sufficiently attained to at Trinity College; having acquired great skill in Greek and Latin, and I have good reason to think in Hebrew also. Besides which, I find, by some of his papers written about that time, that he was very early an excellent orator and naturalist; and upon the account of his great diligence, learning, and virtue, he was soon taken notice of by the College, and at about three years' standing was chosen Minor Fellow of Trinity, on September 8th, 1649, together with his ingenious friend Isaac Barrow; and as Dr. Duport had been tutor to both of them, so he used to boast of them, as Mr. Ray's fellow collegian, the late pious and learned Mr. Brokesby† informed me, who saith, that he in discourse with Dr. Duport, reckoning up several gentlemen of worth that the Doctor had been tutor to, the Doctor said, the chief of all his pupils were Mr. Ray and Dr. Barrow,‡ to whom he esteemed none of the rest comparable.

* Duport, J., D.D., was born at Cambridge, in Jesus College (of which his father was master) in 1606. He was educated at Trinity College, Cambridge, and appointed Regius Professor of Greek in 1632. He was made prebendary of Lincoln and Archdeacon of Stow in 1641, and in 1656 ejected for refusing his engagement. In 1660 he was made chaplain in ordinary to Charles II., and was restored to his professorship, which he subsequently resigned in favour of Dr. Barrow. He was made master of Magdalen College in 1668. He was the author of 'Gnomologia Homeri,' 4to. Cambridge, 1660, and other works. He died in 1679.

† Brokesby, Francis, esq., was born in Leicestershire, in 1637, and died in 1715. He wrote 'The Life of Henry Dodwell,' 1715, 2 vols. 8vo, London; 'Of Education with respect to Grammar Schools and Universities,' 1710, 8vo, London; 'A History of the Government of the Primitive Church for the first three Centuries,' 1702, London, 8vo.

‡ Barrow, Isaac, was the eldest son of Thomas Barrow, linen-draper to Charles I, and descended of a Suffolk family. He was born in 1630, and

Mr. Ray having continued Minor Fellow whilst Bachelor of Arts, was (according to the custom of the college) chosen Major Fellow, when of Master's standing. After which, on October 1st, 1651, he was chosen the Greek lecturer of the college; and on October 1st, 1653, he was made mathematical lecturer; and after that, on October 2d, 1655, humanity reader.

After this, when of greater standing, he was chosen into the offices of the college, and was made Prælector Primarius, October 1st, 1657, and Junior Dean, October 2d, 1658; and lastly, twice College Steward, being sworn into that office December 26th, 1659, and December 16th, 1660.

During this time of Mr. Ray's being in the University,

was placed first in the Charterhouse School, and then at Felstead in Essex. He was entered at Trinity College in 1645, was made scholar of his college in 1667, B.A. in 1648, fellow in 1649, M.A. in 1652, Ad eundem at Oxford in 1653, B.D. in 1661, and D.D. by mandate in 1670. He had intended studying physic when he first went to college; but having changed his mind, he commenced theology. Theology led him to study chronology, and chronology astronomy, and astronomy mathematics. From 1655 to 1659, he travelled on the Continent. On his return in 1660, he was chosen Greek professor at Cambridge, and in 1662 Gresham professor of geometry. This last he resigned in 1663, having been appointed to the Lucasian professorship by Mr. Lucas on its institution. This also he resigned in favour of Isaac Newton, who was then twenty-seven years of age, and whom Barrow thought a young man of great promise. In 1672 he was appointed master of Trinity College, and laid the foundation of the library of that college. He died on the 4th of May, 1677, having achieved a great reputation for a man of so few years. "He was low of stature, lean, of a pale complexion, and negligent of his dress to a fault." "Being invited to preach for Dr. Wilkins," says one of his biographers, "in a parish church in London, his appearance, which was that of an apprentice, drove the whole of the congregation away, except a few persons, among whom was Richard Baxter, the nonconformist, who declared afterwards that he could have sat all day to hear him." He was remarkable for preaching very long sermons. The principal works of Barrow are as follow:—'Euclidis Elementa,' Cambridge 1655; translated, London 1660. 'Euclidis Data,' Cambridge 1657. 'Lectiones Opticæ XVIII,' London 1669. 'Lectiones Geometricæ XII,' London 1670. After his death, his theological works and other writings were collected together, and published by Dr. Tillotson, then Dean of Canterbury, accompanied with the life of Barrow, by Abraham Hill. The reputation which Barrow obtained during his life has not been sustained since his death, but he must still be regarded as taking a high position as a mathematician and a theologian. Although Ray and Barrow were so intimately associated in early life, the tendency of their genius led them to opposite pursuits; and thus we find little further notice of Barrow in the Life of Ray.

he was tutor to many gentlemen of great worth, from several of whom I meet with letters of due praise and acknowledgments.

Neither was he only an eminent tutor, but as eminent a preacher, both in his college and in the University. We have sufficient examples of his performances of this kind in the theological pieces he published, which were all or most of them common-places in his college, or sermons preached in the University; particularly his 'Wisdom of God in the Creation' was a college exercise.

Although, as is just observed, he was much famed for his preaching, he did it in a way very different from the fashion of those fanatical times. His Grace the late pious and learned Archbishop of Canterbury, Dr. Tenison,* (whom I am bound to mention with all due respect and honour,) told me, that Mr. Ray was much celebrated in his time, in Cambridge, for his preaching solid and useful Divinity, instead of that enthusiastic stuff, which the sermons of that time were generally filled with; and that he well remembered the subject of one of his sermons was 'Mundus non senescit,' for which he was much applauded.

His three physico-theological discourses concerning the Chaos, Deluge, and Dissolution of the World, I conceive, were common-places or sermons. His discourse of the Dissolution, he saith, was a sermon he preached of old at St. Mary's in Cambridge, in a letter to his beloved and learned friend Dr. Tancred Robinson,† of July 24th, 1690.

* Tenison, Thomas, D.D., Archbishop of Canterbury, was born in Cambridgeshire in 1636, and died in 1715.

† Robinson, Sir Tancred, M.D., was physician in ordinary to George I., from whom he received knighthood. He was educated at St. John's College, Cambridge, where he took his degree of B.M. in 1679, and of M.D. in 1685. He was not only the friend of Ray, but of many of his contemporaries. He devoted much attention to botany and the natural sciences generally, as is proved by his correspondence with Ray. He was a fellow of the Royal Society, and contributed several papers to the Philosophical Transactions. Amongst others, 'Observations on boiling Fountains and subterranean Streams,' Phil. Trans. 1685; 'On the French Macreuse and Scotch Barnacle,' ibid.; 'Account of the Tubera terræ, or Truffles, found in Northamptonshire, *Lycoperdon tuber*,' Linn., ibid. 1693; 'On the great Age of Henry Jenkins,' ibid. 1696. He died March 29th, 1748.

The first draft of which sermon, as also of some of his other Discourses, I have seen, but not nearly so much enlarged as in the printed tracts.

Having mentioned thus much of Mr. Ray's preaching, I shall take notice of two sermons I have met with, which he delivered at the funerals of two of his friends: one I imagine was at the funeral of Dr. Arrowsmith,* master of his college, on Romans xii, 12, "Patient in tribulation." Which words, he saith, he made choice of, by reason the life of that reverend and learned person, especially the last scene of it, was eminently remarkable for the practice and exercise of the grace of patience, occasioned, I find, by a valetudinarian state of body. But as for the particulars which Mr. Ray recounts of his life, his education at Newcastle-upon-Tyne, his admission into St. John's College, and being called thence to be fellow of Catherine Hall, then preacher at King's-Lynn, after that Regius Professor, Vice-Chancellor of Cambridge, and lastly Master of Trinity College, his wise and good behaviour in all those places and trusts, his meekness, peacefulness, industry, and learning, &c., I say, as for such particulars, mentioned in Mr. Ray's sermon, I shall pass them by as foreign to my purpose.

The other sermon was at the funeral of his most intimate and dear colleague, Mr. John Nid, on Psalm xxxix, 5, "Verily, every man at his best state is altogether vanity." How great the friendship was between these two, may be seen in Mr. Ray's Preface to his 'Catal. Plant. circa Cantabr.' where he calls him *amicissimus et individuus comes;* and applauds him (as he doth more largely in his funeral sermon) for his admirable sweetness and candid temper of mind, his exact probity, and innocence of life and manners, his singular modesty, and his excellent learning, particularly his great and exact skill

* Arrowsmith, John, was born at Newcastle-upon-Tyne in 1602, and died in 1658. He was author of 'Tactica Sacra seu de Milite Spirituali,' Cambridge 1657, 4to, and other religious works and sermons. He was one of the Assembly of Divines in 1643, and assisted in drawing up the 'Assembly's Catechism.'

in the universal history of nature and the works of God; or, in few words, as I find it mentioned in Mr. Ray's sermon, *J. N. operum Dei admirator, probitatis studiosus;* which, as it was exactly agreeable to Mr. Nid's practice, so seems to have been a motto Mr. Nid had pitched upon, it being written by himself in one of his books. From this character of Mr. Nid, it is easy to judge what the cause was of that great intimacy and friendship that was between Mr. Ray and him, viz. the agreement of their genius and studies, and the exact conformity of their humours and manners.

During this intimacy with Mr. Nid, Mr. Ray wrote his 'Catalogue of Cambridge Plants,' which he saith Mr. Nid had a great hand in, and lived to see almost perfected; which piece was published in 1660, and was of singular use in promoting the study of botany, a branch of learning much neglected at that time, not only in Cambridge, but in most other parts of the kingdom. But after this book was published, (as Mr. Ray himself told me, than whom no man ever spoke with greater modesty of himself or his performances,) "many were prompted to those studies, and to mind the plants they met with in their walks in the fields."

This book meeting with a kind reception among the learned and curious, encouraged Mr. Ray the farther to proceed in these studies and observations. And not content with what he met with about Cambridge, he extended his pursuits throughout the greatest part of England and Wales, and part of Scotland; in which he had commonly the company of several curious gentlemen, particularly Mr. Willughby, his pupil Mr. Skippon,* (afterwards Sir Philip,) and Mr. Peter Courthorpe.

Of these journeys he left accounts behind him, a great part of which are here published.

The first of these journeys was from August 9th to

* Skippon, Sir Philip, was the author of 'Salve for every Sore; a book of promises out of the book of God,' London, 8vo, 1643; 'The Christian Centurion's Advices and Resolutions,' London, 8vo, 1645; and other religious works.

September 18th, 1658; which he took by himself alone through Northamptonshire, Warwickshire, Leicestershire, Derbyshire, Lancashire, Cheshire, Flintshire, Denbighshire, Carnarvonshire, Anglesea, Merionethshire, Shropshire, Worcestershire, and Gloucestershire.

After this journey, having finished his 'Cambridge Catalogue,' and published it, as I said, in 1660, and peaceable times coming on, by the restoration of the king and royal family, Mr. Ray began to think of entering into holy orders, and at the latter end of the year was ordained both deacon and priest by the learned Bishop Sanderson;* one or both which orders his Lordship, then Bishop of Lincoln, conferred upon Mr. Ray, in his Chapel in Barbican, in London, on the 23d of December, 1660.

But now, if it should be asked, How came it to pass that Mr. Ray, who was not in orders till 1660, was admitted to preach (as I have said he did) in the college chapel and at St. Mary's, before the University? I briefly answer, in the before-mentioned Mr. Brokesby's words, "that preaching and common-placing were then commonly performed by persons not ordained."

After his ordination, Mr. Ray continued to pursue his inquiries after plants, and other curiosities, and therefore took another journey (accompanied by Mr. Willughby,†

* Sanderson, Robert, D.D, Bishop of Lincoln, was born at Rotherham in Yorkshire, in 1587. He studied at Oxford, and was made canon of Christchurch, and regius professor of divinity in that University in 1642. He was distinguished as a theological casuist, and wrote many works on theological subjects. He died January 29th, 1662. His life and sermons were edited by Izaak Walton, and published in London in 1689.

† Willughby, Francis, was the only son of Sir Francis Willughby, knight, and was born in 1635. His father, who was in easy circumstances, paid great attention to the education of his son, who was so diligent in his studies that it was feared he would injure his health. He early acquired great knowledge both of the classics and mathematics, and in the various branches of natural science. He was admitted at Trinity College, Cambridge, and took his degree of Bachelor of Arts in 1656, and of Master of Arts in 1659. It was here that he became a pupil of John Ray, and a lasting friendship was soon formed between the master and pupil. Willughby had a mind constituted very similarly to that of Ray, and both of them took great interest in the progress of natural science. Ray had at this time made great

and some other gentlemen) through Huntingdonshire, Northamptonshire, Lincolnshire, Yorkshire, the bishoprick of Durham, Northumberland, and so into Scotland, as far as Glasgow and Stirling, and thence back again through Cumberland and Westmoreland. They set out on July 26th, 1661, from Cambridge, and finished their journey the 30th of August.

The year after this, Mr. Ray (and Mr. Willughby with him) took another journey from Cambridge. They set out on May 8th, 1662, and passed through Northamp-

progress in the study of botany, and had already begun to reduce to harmony the confused facts which had been heaped together in that department of science; and this seems to have inspired Willughby to do the same for zoology. The Pandects of Gessner and Aldrovandus had been published, but the question that occurred to his mind was, How much of all this is true, and how much is false? To answer this question for the science of zoology as it then existed, he set to work. For this purpose he went to Oxford in 1660, in order that he might consult the works on natural history in the libraries there. Shortly after the return of Willughby from Oxford, Ray refused to subscribe to the Bartholomew Act, and was obliged to resign his fellowship and leave Cambridge. The consequence was that the two friends made a tour on the Continent, visiting France, Spain, Italy, Germany, and the Low Countries, with the object of gaining all possible information on natural history: Ray examined plants, whilst Willughby attended to the animals. They returned laden with treasures, which Willughby immediately commenced working at, for the purpose of publishing a large work on the animal kingdom. Before doing this, he contemplated a voyage to America, in order to add to his knowledge. But he died, in the midst of all his labours and in the prime of life, on the 3d of July, 1672. He had published little, and thought his labours too imperfect to justify their publication. Ray however urged upon him, as he says in one of his works, for three reasons, that he should allow him to publish his works: first, the glory of God; secondly, the assistance of others in the same studies; and thirdly, the honour of their native land. Upon these grounds he permitted his works to be published, and Ray became their editor. He also left Ray one of his executors, and committed to him the charge of educating his two sons, Francis and Thomas. Francis, the elder, who was then only four years old, died young; and Thomas subsequently became Lord Middleton. For this office, which Ray sacredly fulfilled, Willughby left him 60*l.* a year, which constituted the chief part of this great man's income throughout his life.

The first work edited by Ray after Willughby's death was his Ornithology, with the title 'Ornithologiæ Libri Tres: in quibus Aves omnes hactenus cognitæ, in methodum naturis suis convenientem, redactæ, accurate describuntur. Descriptiones iconibus elegantissimis et vivarum avium simillimis æri incisis illustrantur. Totum opus recognovit, digessit, supplevit Johannis Raius,' London, 1676, folio. This work was translated into English by Ray, and the plates republished in 1678. It contains a vast amount of original observation, and gives a very full and exact account of the habits of the birds described, as well as of their diseases, and the mode of keeping

tonshire, Warwickshire, Staffordshire, Cheshire, Flintshire, Denbighshire, Carnarvonshire, Anglesea, Merionethshire, Montgomeryshire, Cardiganshire, Pembrokeshire, Carmarthenshire, Glamorganshire, Monmouthshire, Gloucestershire, Somersetshire, Devonshire, Cornwall, Dorsetshire, Wiltshire, and Hampshire, and returned in July following.

During all this period, Mr. Ray continued fellow of Trinity College, till the beginning of the Bartholomew Act,* which, requiring a subscription against the "so-

them. There are frequently also good accounts of dissections of various birds. Cuvier says that all subsequent writers have followed Willughby, and that his observations are wonderfully correct. The English work concludes with a treatise on Falconry. Although Ray seems to have taken great trouble with the plates, they are too inaccurate to be of use at present. But the letterpress is a perennial source of correct observation on the habits and structure of birds. In 1686 Ray edited a second work on the same plan, embracing the fishes. This was published at London, in folio, with the title 'Historiæ Piscium Libri Quatuor.' The descriptions in this work are good, and Cuvier states that it contained many observations on the Mediterranean fishes that could not be found elsewhere. In all his descriptions Willughby was very careful in distinguishing specific characters; and in this way he corrected many of the errors of preceding writers.

Willughby and Ray were early Fellows of the Royal Society of London, and Willughby contributed some papers to the 'Philosophical Transactions' before his death. Two of these were published in the 'Transactions' for 1671; one of them 'On a kind of Wasp called Ichneumons,' and another 'On the Hatching of a kind of Bee lodged in old willows.' Ray afterwards contributed many papers on insects, of which the substance had been prepared from Willughby's manuscripts.

Ray, in the preface to the 'Ornithologia,' has left behind him a beautiful memorial of the estimation in which he held his friend in the summary he there gives of his character. He seems to have added to habits of excessive industry and a rare philosophical genius, every virtue. It is no small praise to say he was worthy of his master and his friend. The influence of Willughby undoubtedly, under the direction of Ray, has been very great in every department of zoology; and had he lived to have laboured more, and to have developed the great principles of classification in zoology, which Ray did in botany, then might it have been said that the modern foundation of both sciences was laid at the same period in Great Britain.

* Among some miscellaneous observations of Mr. Ray's one is as follows: "September the 18th, 1662. The names of such fellows of Colleges in the University of Cambridge, as were deprived for not subscribing according to the new Act for Uniformity, 1661: St. John's College, Mr. Wood and Mr. Tuckney; Trinity College, Mr. Wray; Emanuel College, Mr. Illingworth, Mr. Hulse, and Mr. Brinsley; Pembroke Hall, Mr. Clifford and Mr. Green; Bennett College, Mr. Chapman; Jesus College, Mr. Huffe; Magdalen College, Mr. Hill and Mr. More; King's College, Mr. Duncombe; besides these, Dr. Dillingham, master of Emanuel College."—G. S.

lemn league and covenant," occasioned Mr. Ray to resign his fellowship, he refusing to sign that declaration. But the reason of his refusal was not (as some have imagined) his having taken the "solemn league and covenant," (for that he never did, and often declared that he ever thought it an unlawful oath;) but he said he could not declare, for those that had taken the oath, that no obligation lay upon them, but feared there might. And one thing that unfortunately then happened was (as Mr. Brokesby informed me,) that he was at that time absent from his college, where he might have met with satisfaction to his scruples, and was among some zealous Nonconformists, who too much influenced him by the addition of new scruples. And we may also ascribe somewhat to prejudice of education in unhappy times.

Having now left his fellowship, and visited most parts of his own country, he was minded to see what Nature afforded in foreign parts; and accordingly I find Mr. Willughby and him consulting, towards the latter end of this year, about travelling the next spring, and considering whom they should invite to go with them;* and having persuaded Mr. Skippon (afterwards Sir Philip) and Mr. Nathaniel Bacon† (two of Mr. Ray's pupils) to go along with them, they all four, next spring, viz. on April 18th, 1663, went over from Dover to Calais, and from thence through divers parts of Europe; which I but barely mention, as Mr. Ray himself, in the year 1673, published the observations they made in that tour.

Towards the latter end of their journey, Mr. Willughby and Mr. Ray parted company, the former passing through Spain, and Mr. Ray from Montpelier, through France,

* See the preface to Mr. Ray's Foreign Travels.

† Bacon, Nathaniel, wrote several works on the laws and government of England; amongst others, 'An historical and political discourse of the Laws and and Government of England from the first times to the end of the reign of Queen Elizabeth, with a Vindication of the ancient way of Parliament in England, collected from some MS. Notes of John Selden, Esq.;' London, 4to, 1647. A fifth edition in folio was published in 1739. Another edition was printed in 1760.

into England, where he arrived about the beginning of March 1665-6.

How he spent this time after his arrival in his own country, may be seen in a letter of his to Dr. Lister,* of June 18th, 1667, in which he saith, "For my own part, I cannot boast of many discoveries made the last year, save of mine own errors. After I took my leave of you at Cambridge, I divided the remainder of the summer between Essex and Sussex, visiting several friends. My spare hours I bestowed in reading over such books of natural philosophy as came out since my being abroad, viz. Mr. Hook's 'Micrographia,' Mr. Boyle's 'Usefulness of Natural Philosophy,' 'Origine of Forms,' 'Hydrostatical Paradoxes,' Sydenham 'de Febribus,' 'The Philosophical Transactions,' 'the Business about great Rakes,'† turning over Kircher's 'Mundus subterraneus,' &c. The most part of the winter I spent in reviewing, and helping to put in order, Mr. Willughby's collection of birds, fishes, shells, stones, and other fossils; seeds, dried plants, coins, &c.; in giving what assistance I could to Dr. Wilkins, in framing his tables of plants, quadrupeds, birds, fishes, &c.,

* Lister, Martin, M.D., was born of a Yorkshire family, in the county of Buckingham, in 1638. He studied at St. John's College, Cambridge, of which he was made a fellow by royal mandate in 1670. He commenced the practice of physic in York, but removed to London in 1683. In 1698 he attended the Earl of Portland in his embassy to the court of France, and on his return published the result of his observations in a work entitled 'A Journey to Paris,' London, 1698, 8vo. He wrote several medical works. He was contemporary with Sydenham, and occasionally indulged in very severe remarks upon the practice of that great physician. His labours in natural history are of more value than those in medicine. He contributed upwards of thirty papers on various departments of zoology and botany to the 'Philosophical Transactions.' He also published the following works on natural history: 'Historiæ Animalium tres Tractatus; unus de Araneis; alter de Cochleis terrestribus et fluviatilibus; tertius de Cochleis marinis,' London, 4to, 1678; 'Exercitatio Anatomica de Cochleis maxime terrestribus et Limacibus,' London, 8vo, 1694; 'Exercitatio Anatomica altera de Buccinis fluviatilibus et marinis,' London, 8vo, 1695; 'Exercitatio tertia Conchyliorum Bivalvium,' London, 4to, 1696. He was an industrious and accurate observer, and exercised an important influence on the departments of natural history, to which his attention was more particularly directed. He died in 1711.

† They are now come into general use among the farmers, and are called *drag-rakes*.—G. S.

for the use of the universal character; in gathering up into a catalogue all such plants as I had found at any time growing wild in England, not in order to the present publishing of them, but for my own use; possibly, one day they may see the light; at present, the world is glutted with Dr. Merret's* bungling 'Pinax.' I resolve never to put out anything which is not as perfect as is possible for me to make it. I wish you would take a little pains this summer about grasses, that so we might compare notes; for I would fain clear and complete their history. I intend, this summer, to travel farther, either northward or westward, or both, in quest of plants and fishes."

These tables, which Mr. Ray saith were framed for Bishop Wilkins,† were partly drawn up by Mr. Willughby

* Merrett, Christopher, M.D., was born in Gloucestershire in 1614, and practised in London as a physician. He published books on a variety of subjects, medical and natural-historical. The work to which Ray alludes here was called 'Pinax Rerum naturalium Britannicarum continens Vegetabilia, Animalia et Fossilia in hanc Insula reperta,' London, 12mo, 1666. He also published some papers in the 'Philosophical Transactions,' and a work on 'the Acts of Parliament, Charters, Trials at Law, and Judges' Opinions concerning the Grants to the College of Physicians, London;' London, 4to, 1680. He died in 1695.

† Wilkins, John, was Bishop of Chester in the reign of Charles II, and, according to Anthony à Wood, was "a person endowed with rare gifts," "a noted theologist and preacher, a curious critic in several matters, an excellent mathematician and experimentalist, and one as well seen in mechanisms and new philosophy (of which he was a great promoter) as any of his time." He was the son of Walter Wilkins, a goldsmith and citizen of Oxford, but was born at the residence of his maternal grandfather, John Dod (a nonconformist of some note, and author of several theological works, from one of which, 'An Exposition of the Ten Commandments,' he is styled "the Decalogist,") at Fawsley, near Daventry in Northamptonshire, in the year 1614. Wilkins appears to have remained with his grandfather until he arrived at a proper age for entering a grammar-school, when his father placed him under Mr. Edward Sylvester, an Oxford schoolmaster. In Easter Term, 1627, at the age of thirteen, he was admitted a student at New Inn Hall, whence he shortly removed to Magdalen Hall, where for a short time he was under the tuition of John Tombes, the celebrated Anabaptist and opponent of Baxter. Tombes left the university while Wilkins was an under-graduate, and he did not proceed to his first degree at the usual time; but he took the degree of B.A. October 20, 1631, and that of M.A. June 11, 1634. Having then arrived at the age of twenty-one, he took orders, and became successively chaplain to William, Lord Say; George, Lord Berkeley, and Charles, Count-palatine of the Rhine, with whom he resided for a considerable time while he was in England. The skill of Wilkins in the mathematics, to which that prince was much attached, is said to have been his

and Mr. Ray, who were the best able of any men living for such an undertaking; but yet, when they had done

chief recommendation for the last-mentioned appointment, which gave him much opportunity for prosecuting his favorite studies. During this time he wrote several small treatises on mechanical philosophy. His early education had given him a strong bias towards puritanical principles, and accordingly on the breaking out of the civil war he took part with the parliament and Presbyterians, and became a party to the "solemn league and covenant." Academical studies at the universities being much interrupted by the disturbances of that period, Wilkins assiduously promoted those meetings in London which eventually led to the formation of the Royal Society. According to Bishop Sprat and Dr. Wallis, indeed, he was the principal promoter of the meetings referred to, at which political and theological discussions were strictly avoided, while every branch of natural philosophy was made a subject of inquiry. In 1648 he was selected by a committee appointed for the reformation of the university of Oxford to fill the office of warden of Wadham College, and on the 13th of April, having taken the degree of B.D. on the preceding day, he was put in possession of the wardenship, which was rendered vacant by the ejection of the loyalist warden, Mr. John Pitt. On the 18th of December, 1649, he became D.D., and about the same time he took the required engagement of fidelity to the new commonwealth. Being unable after his removal from London to attend the philosophical meetings, he took part in the establishment of an association of similar character at Oxford, and from the year 1752, prior to which the society had met at the lodgings of Dr. Petty, to the end of his wardenship, the meetings were held in Wadham College. In or about the year 1656 Wilkins married Robina, widow of Peter French, and sister of Oliver Cromwell, from whom he obtained a dispensation for retaining his office, notwithstanding the rules of the college, which imposed celibacy on the warden. Burnet states, in his 'History of his Own Time,' that he made no other use of this alliance "but to do good offices, and to cover the University of Oxford from the sourness of Owen and Goodwin." In the early part of the year 1659, after the death of Oliver, Richard Cromwell appointed Wilkins master of Trinity College, Cambridge, and there also he exerted himself to increase a taste for experimental philosophy, as well as to substitute a spirit of universal benevolence for narrow party feelings. At the restoration, in the following year, he was ejected from his mastership, and for some time he remained out of favour, both at court and with the Archbishop of Canterbury, on account of his marriage. While his fortunes were at this low ebb, Wilkins was chosen preacher to the Society of Gray's Inn; and being thus again brought to reside in London, he entered with ardour into the proceedings of the philosophical association with which he had formerly been connected, and which now assumed a more organized form. In 1662 he was presented to the rectory of St. Lawrence, Jewry, in the gift of the crown, and on the formation of the Royal Society, in the following year, he became one of the council. Having obtained favour at court, he was soon promoted to the deanery of Ripon, and in 1668 to the bishopric of Chester, to which he was consecrated on the 15th of November: Dr. Tillotson, who had married his step-daughter, preached his consecration sermon. It is related that he obtained this bishopric through the interest of the Duke of Buckingham; and Walter Pope, in his Life of Seth Ward, Bishop of Salisbury, says that he had it not only without, but against the consent of the Archbishop of Can-

it, I find they were not well pleased with it, thinking it imperfect and capable of great amendments, which they

terbury (Sheldon), who subsequently, after he knew him personally, declared that the prejudice which he had entertained against him was unjust. Wilkins died November 19th, 1672, of a suppression of urine, which was mistaken for stone, and mistreated. He was at the time of his death at Tillotson's house in Chancery Lane, London, and he was buried in the church of St. Lawrence, Jewry. Tillotson was appointed executor to his will, which gave 400*l.* to the Royal Society, and 200*l.* to Wadham College. In Bliss's edition of the 'Athenæ Oxonienses' are notices of a few other ecclesiastical preferments of Wilkins, not mentioned above.

Some of Wilkins's works are exceedingly curious, although, as might be expected from the state of science in his day, they contain much that is chimerical and absurd. The principal are the following: 1, 'Discovery of a New World; or a discourse tending to prove that it is probable that there may be another habitable world in the Moon; with a discourse concerning the possibility of a passage thither.' This work, which appeared in 1638, and was several times re-printed, excited much ridicule, although but few of the fourteen propositions which the author endeavours to establish would be questioned by modern astronomers and philosophers; the last, that it is possible for some of our posterity to find out a conveyance to the other world which he supposes to exist in the moon, and if there be inhabitants there, to have commerce with them, is perhaps the only one that could be seriously opposed or called in question. Wilkins however endeavours to prove that the construction of a flying-machine of sufficient capacity for such a voyage is by no means the chimerical absurdity which most, even in the present day, would consider it. 2, 'Discourse concerning a new Planet, tending to prove that it is probable our Earth is one of the Planets,' published in 1640. These two works appeared anonymously but were well known to be by Wilkins. 3, 'Mercury, or the Secret and Swift Messenger; showing how a man may with privacy and speed communicate his Thoughts to a Friend at any distance.' This curious volume contains notices of a great number of schemes for telegraphic communication, writing by cipher or in sympathetic inks, and other means of secret or rapid communication. One chapter, the eighteenth, is devoted to suggestions for 'a language that may consist only of tunes and musical notes, without any articulate sound.' 4, 'Mathematical Magic, or the Wonders that may be performed by Mechanical Geometry,' a singular work, the object of which is tolerably defined by its title, published in 1648. 5, In 1668 appeared, in one folio volume, printed by order of the Royal Society, an 'Essay towards a Real Character and a Philosophical Language,' a work founded upon or suggested by a treatise published a few years previously by George Dalgarno. To this is appended an 'Alphabetical Dictionary, wherein all English words, according to their various significations, are either referred to their places in the Philosophical Tables (in the Essay) or explained by such words as are in those tables.' The first four of the preceding works were reprinted in 1708, and again in 1802, in a collected form, together with an abstract of the 'Essay towards a Real Character.' Wilkins also published several theological works, of which 'Ecclesiastes, or a Discourse of the Gift of Preaching as it falls under the Rules of Art,' passed through several editions, the first having appeared in 1646. His 'Discourse concerning the Beauty of Providence, in all the Rugged Passages of it,' first published in 1649, and 'Discourse concerning

afterwards gave it, in their 'Histories of Plants and Animals.' But it is not at all to be wondered at, that such an account should be defective at the beginning, before they had fully weighed and considered so new a subject as that was at that time, a part of learning but little studied or cultivated, that lay confused and without any, or no better than no method; but which those two great men so cleared up, methodized, and advanced, that to them may be ascribed a great deal of that perfection to which natural history is now arrived.

Having traced our great man's life to the year 1667, and 39th year of his age, the next thing I meet with is his farther prosecution of his researches into the history of nature; the summer of this year, by another journey into the west of England, in company with his most honoured and beloved friend Mr. Willughby. They set out from Mr. Willughby's seat, at Middleton Park in Warwickshire, on June 25th, 1667, and travelled through the counties of Worcester, Hereford, Gloucester, Somerset, and Devon, into Cornwall, as far as the Land's End, where they arrived August the 17th; and then returned through Hants to London, on September the 13th following. In this journey they described many fowls, fishes, and plants, and took notes of the mines, the way of smelting metals, making salt, and divers other things, which I find in Mr. Ray's diary of that journey.

By this time Mr. Ray had much signalized himself for his great skill in curious matters, and therefore was importuned to come into the Royal Society; and accordingly he was admitted Fellow, on November the 7th; and in the same month, viz., November the 16th, being*

the Gift of Prayer,' published in 1651, were also repeatedly reprinted. Wilkins left his papers to the care of his friend Tillotson, allowing him to use his own discretion as to publishing any of them; and in 1675 appeared a treatise 'Of the Principles and Duties of Natural Religion,' which he had left in an unfinished state. In 1682 Tillotson published a volume containing fifteen of Wilkins's sermons, and some others were published separately during his life, and also after his decease.

* As appears by a memorandum in Mr. Ray's own hand-writing.—G. S.

solicited by Dean Wilkins to translate his "Real Character"* into Latin, he consented to do it; and indeed he was one of the fittest men living to undertake it, on the account of his being a complete master of that language, as well as excellent in that kind of learning. This work he laboured at for a good while; and although very heavy, he accomplished it, as I find by the original manuscript, which is now in the library of the Royal Society, ready for the press, if any Mæcenas should have a mind to let it see the light.

Having spent the latter end of this year, and the beginning of 1668, with his friends Mr. Burrel and Mr. Courthope, at Danny in Sussex, and Sir Robert Barnham, at Bocton in Kent, (all three his pupils at Trinity,) and Mr. Willughby in Warwickshire; he then, in July following, began another journey alone by himself (his friend Mr. Willughby being then newly married) into Yorkshire and Westmoreland, where he described many plants, fowls, &c., and then returned in September to Middleton Hall, where he spent most of the following winter with his friend Mr. Willughby.

In the following spring, those two great virtuosos entered upon those experiments about the tapping of trees, and the ascent and descent of their sap; which are published in the 'Philosophical Transactions,' and may be met with together in Mr. Lowthorp's Abridgement, (vol. ii, p. 682, &c.) Among Mr. Ray's observations, I find some deserving notice, not published with the rest, viz., "that the sap of any tree, running down the side of the tree, or dropping long on one place, will precipitate a kind of white coagulum or jelly, which may be well conceived to be the part which, every year, between bark and tree, turns to wood, and of which the leaves and fruit are made. And it seems to precipitate more when

* In this work (see notice of Wilkins, page 18,) Bishop Wilkins was much assisted by both Willughby and Ray. It does not appear that Ray's translation ever saw the light, nor have I been able to find the MS. either in the library of the Royal Society or the British Museum.

the tree is just ready to put out leaves, and begins to cease dropping, than at its first bleeding."

A second observation is, "that the sap ascends, not only between the bark and tree, but by all the pores of the wood, (which they had demonstrated in the printed account from another observation) and that this is undeniably proved, by boring in the same tree holes of several depths, or the same hole double the depth. For, from a hole, suppose of two inches depth, will issue near double the quantity of what proceeds from a hole of one inch depth. So from the same hole, if it be bored on to double the depth it had, will issue double the liquor that at first did."

Another experiment was, for a farther proof of the sap's ascent through the woody part of the tree. "To put it out of all doubt," saith Mr. Ray, "we took away, on one side of a birch tree, bark and wood to a considerable depth, and bored a hole into the tree, where the piece was taken away; out of which hole it bled copiously, notwithstanding we carefully prevented any other sap coming on the filter, but what proceeded from the hole."*

About this time, Mr. Ray (that he might make his journeys as useful to the world as they had been entertaining to himself) began to draw up his observations for the use of the public. And one of the first things he set upon was his 'Collection of Proverbs,' which he digested into the most convenient method he could, for the more easy and speedy finding them on occasion. This book, although about this time fitted up for the press, and sent to Cambridge to be there printed, in 1669, yet was not published till the year 1672.

In this year (1669) Mr. Ray prepared also his 'Cata-

* Another observation I meet with in this year, or rather the beginning of 1669, is an Account from Mr. Jennings, the High Sheriff of Warwickshire that year, viz. "That if among the charcoal wherewith they melt their iron-mine there be any considerable quantity made of holly, it will make the iron brittle, and have the same effect upon it that any sort of pyrites mixed with pit-coal or sea-coal hath. But if the holly be barked before it be charred, or made into coal, it will have no such effect."—G. S.

logue of English Plants' for the press, which was first published in the year 1670, and afterwards in 1677. His humble thoughts of which, and his other books, may be seen in a Latin letter of his to Dr. Lister, of August the 22d, 1670.*

In the same letter he also takes notice of his altering his name, by leaving out the W in the beginning of it. This way of writing his name Wray, was what he had used all the time he was in the University, at least, whilst he was at Trinity, his name being always with a W in the college register. And so in the 'Philosophical Transactions,' before the year 1670, he writes his name Wray. But this being, he saith, contrary to the way of his forefathers writing their names, he therefore re-assumed the name of Ray; and, in all probability, this he took to be the truest way of writing it, as being derived from such places as bear the name of Ray; as the Ray-field, the Ray-house, the Ray-mead, &c.; which is appropriated to places adjoining to navigable (but not exclusive of other) rivers, where people "row," or pass along with boats; and is derived, I conceive, from the Saxon word ꝛeꝺan, *remigare*, to row; or ꝛeaꝛꝛe, *remigium*, an oar.

In the same letter he mentions another thing relating to himself, which was an offer of two hundred pounds per annum, to travel with three young noblemen into foreign parts. This proposal he had once a mind to have come into, and the rather, that he might review the Alpine plants; but upon more serious consideration, he thought fit to spare his weakly body and stay at home; being *suo modulo contentus*, or as Melantus in Homer saith,

Αἰτίζων ἀκόλους, οὐκ ἄορας, οὐδὲ λέβητας.

Odys. 17.

For a close of these two years, 1669 and 1670, I shall take notice of an article which I meet with among Mr.

* See Letters.

Ray's notes in these years, viz., October the 14th, 1669. "We rode to see the famous fir trees, some two miles and a half distant from Newport, in a village called Wareton, in Shropshire, on the land of Mr. Skrimshaw (Skrymsher). There are of them thirty-five in number, very tall and strait, without any boughs till towards the top. The greatest, and which seems to have been the mother of the rest, we found, by measure, to be fourteen feet and a half round the body, and they say fifty-six yards high, which to me seemed not incredible. The tenant's name of the house, close by these fir trees, is Firchild, whose ancestors have been tenants to it for many generations."*

* Wishing to know the present state of these trees, I wrote to the Reverend W. Leighton, of Lucefield, near Shrewsbury, who kindly made inquiries of his friend, R. S. Higgins, esq., surgeon, Newport, and to whom I am indebted for the following communication, in a letter to Mr. Leighton on the subject:

"The fir trees at Warton are mentioned in an old book of my father's, entitled 'ΘΕΟΛΟΒΟΤΟΝΟΛΟΓΙΑ sive Historia Vegetabilium Sacra; or a Scripture Herbal, by William Westmacott, of the borough of Newcastle-under-Line, in the county of Stafford, Physician,' London, 1694. 'Fir tree: There are thirty-six of this sort grow disorderly, of an excessive height, at Warton (on the land of the Right Worshipful Sir Charles Skrymsher of Norbury in this county) in the hedges and fields, many of them being about forty yards high, and one of them is forty-seven yards and a half, having the advantage of a rising ground, they appear pleasantly, as so many spire steeples to travellers, and at a far distance on the roads, particularly as you ride Worcester Road from Tonge Castle to Newport.' The extract from Ray says there are of them thirty-five in number, and the greatest fifty-six yards high; so that he must have visited them after Westmacott. I find Ray died in his 78th year, in 1705. Westmacott, in another part of his Herbal, speaks of having been in practice in 1674, and may have visited the trees some years before his work was published. I do not think his description is taken from Dr. Plot's Natural History of the county, or he would have acknowledged it; for he quotes Plot in some instances, and also Ray. Some time ago I inquired respecting the Worcester Road, and was informed it crossed the London Road at Whiston Cross, four miles beyond Shiffnal. The distance from Warton is about fifteen miles.

"In Pitts 'Topographical History of Staffordshire,' 1817, department the second, page 166, (*Walton* is evidently a misprint,) 'A fir tree grew at *Walton*, in the parish of Norbury, six yards about, and forty-seven yards high, according to admeasurements of it by three distinct persons, at three different times.'

"I find no mention of the fir trees in the 'Natural History of the County of Stafford' by Mr. Garner, recently published. Withering, in the first edition of his Botany, 1776, vol. ii, 593, says, 'Pinus picea, yew-leaved, Abies Ray, syn. 441. The thirty-six fine trees of this species mentioned by Mr. Ray as growing at Wareton, near Newport in Shropshire, are now no more.' Withering first settled at Stafford, and appears to have been at Aqualate

The next year, viz., in the spring of 1671, Mr. Ray was afflicted with a feverish disorder, which ended in the yellow jaundice; but he was soon cured of it, by an infusion of stone-horse dung with saffron in ale.*

All the first months of this year (1671) he tried many experiments about the bleeding of trees, till the warmer spring months invited him out to visit divers of his friends and acquaintance.

Returning from this journey to Middleton, and having rested himself there about eight or nine days, he began another simpling journey into the north, on July the 3d, 1671, taking Thomas Willisel† along with him. They travelled through Derbyshire, Yorkshire, Westmoreland, Cumberland, and Northumberland, as far as Berwick; and then back through the Bishopric of Durham, again to Middleton.

Mere (which is in the adjoining parish of Forton,) and being so near, would doubtless visit the spot where these famous fir trees grew. In your 'Flora of Shropshire,' you have inserted 'Borders of Aqualate Mere,' on the authority of Withering as a locality for *Calamagrostis lanceolata*. I know Warton well, and the persons likely to give information respecting the fir trees; and I went there yesterday to inquire about them. There is no one living who has any recollection of them. The oldest inhabitant of Sutton, an adjacent village, who has always lived in the neighbourhood, does not remember them. Mr. Derrington, who lives at the only farm-house now at Warton, showed me the 'rising ground' where he had heard his father say the fir trees grew, close to the back of the house formerly occupied by the Firchilds. The property was sold by a gentleman named Roe, who went to America, to Sir T. F. F. Boughey, bart., of Aqualate, a few years ago, and the house was pulled down this year. Mr. Derrington, who has lately sold his farm to Sir T. B., now occupies the land which is in Staffordshire, in the parish of Norbury. *Warton* derives its name, according to Plot, as quoted by Pitt, p. 275, from some battle fought hereabouts by the Romans. The ancient family of Skrymsher, formerly the possessor of Aqualate, &c., is now extinct. The last member of it died a spinster a few years since. The Firchilds have left the neighbourhood. Mr. F. having sold his property at Sutton to the late Sir John Boughey upwards of twenty years ago, went to Birmingham. It seems to be generally known in the neighbourhood of Warton that the ancestor of the Firchilds was found under one of the fir trees, and hence derived the name of Firchild. I am sorry I cannot ascertain how long the fir trees grew after the time of Ray."

* See Mr. Ray's letter to Dr. Lister, June 28th, 1671.

† A person well skilled in botany, who was employed by, and was very serviceable to Mr. Ray, in collecting and sending him the descriptions of plants, &c., in journeys he took over England for that purpose. (See Letters.) What opinion Mr. Ray had of Mr. Willisel's judgment, may be seen in a letter of Mr. Ray's to him.—G. S.

But a stop was soon put to these his good designs, by Mr. Willughby falling very dangerously ill the very next month, first with a violent pain in his head, which, by using diascordium,* fell into his breast, and became a pleurisy, which shifted to a fever, and that remitting he grew better; but returning, it carried him off, on July the 3d, 1672, at Middleton Hall, "to the infinite and unspeakable loss and grief" says Mr. Ray, of "myself, his friends, and all good men."

Thus was the world deprived of this great and good man, in his very prime; for he was taken off in the thirty-seventh year of his age. His example deserves the imitation of every person of great estate and honour. For he was a man whom God had blessed with a very plentiful estate, and with excellent parts, capable of making him useful to the world; and accordingly he neglected no opportunity of being so. He did not (as the fashion too much is) depend upon his riches, and spend his time in sloth or sports, idle-company keeping, and luxury; but practising what was laudable and good, what might be of service to mankind. And among other virtuous employments, one he much delighted in was the searching after, and describing of animals, (birds, beasts, fishes, and insects,) which province he had taken for his task, as Mr. Ray had that of plants. And in these matters he was a great master, as he was also in plants, fossils, and, in short, the whole history of nature; to which I may add that of coins, and most other curious parts of learning; and in the pursuit and acquest of this knowledge he stuck neither at any labour or cost; noble monuments of which he left behind him, in those posthumous pieces which Mr. Ray afterwards published; of which I shall have occasion to speak hereafter.

There being the greatest intimacy and friendship con-

* This medicine is an electuary made with the plant, called Scordium (σκοροδον of the Greeks,) by the older botanists, and is the *Teucrium scordium* of Linnæus. It is a bitter aromatic plant, but not now used in medicine.

tracted between Mr. Willughby and Mr. Ray, from the time of their being fellow-collegians at Trinity College, Mr. Willughby, therefore, not only confided in Mr. Ray in his life time, but at his death also, leaving him one of the five executors of his will; Sir Thomas Wenby, Mr. Barnard, Mr. Philip Skippon (afterwards Sir Philip), and Mr. Jessop, being the other four. And as a special mark of his friendship and confidence, he left Mr. Ray sixty pounds a year during his life, and charged him with the care of the education of his sons, Francis and Thomas, the elder of which, dying before he came of age, the younger became Lord Middleton. These two gentlemen being then very young (the eldest not four years of age,) Mr. Ray, as a faithful trustee, betook himself to the instruction of them; and Mrs. Ray herself also (after their marriage) was an assistant in this matter, she being the person that taught Lord Middleton his letters, and to read English.

For the sake and service of these two young gentlemen, Mr. Ray composed his 'Nomenclator Classicus,' which was first published in this very year 1672; and the reason why he composed this book, when many others were extant, was because there were multitudes of errors in all Nomenclatures then in use, especially in the names of animals and plants. And as he was the best able of any man living to assign the true meaning of both the Latin and Greek names, so it was a very useful and valuable task he undertook; serviceable, not only to schoolboys, but to the amendment of our Dictionaries and Lexicons, as may be seen in some of the best of them, that have been published since that time. In most of which, I observe, that they make use of the significations of words assigned by Mr. Willughby and Mr. Ray, which scarce ever was done before by the old grammarians; but yet sometimes they cannot forbear approving of the old signification, which inveterate custom hath made familiar to them.

Having this trust reposed in him, Mr. Ray was forced

to lay aside the thoughts he had of another western simpling journey, and indeed of all journeys of that kind, he thinking it his duty to be as assistant to his dear friend's family as he could. For which reason, he much confined himself to Middleton Hall; and the journeys he took were about matters relating to his trust.

Immediately after Mr. Willughby's death, Dr. Lister invited Mr. Ray to come and live with him at York; but nothing could draw him from the faithful attendance on his trust.

Not many months after the death of Mr. Willughby, Mr. Ray lost another of his best friends, Bishop Wilkins; whom he visited in London, on November the 18th, 1672, and found him near death, by a total suppression of urine for eight days; and the next morning, November the 19th, about four of the clock, that great man died, to Mr. Ray's unspeakable loss and grief, as he expresseth it.

Mr. Ray having thus lost some of his best friends, and being in a manner left destitute, began to have thoughts of marriage, having met with a young gentlewoman (then in the family he was in) of about twenty years of age, whose piety, discretion, and virtues, recommended her to him, as well as her person. Her name was Margaret, the daughter of Mr. John Oakeley, of Launton in Oxfordshire, a gentleman of a younger branch of a family of that name in Shropshire. They were married in Middleton Church, on June the 5th, 1673, by the Reverend Mr. Antrobus, minister of the parish.

Towards the latter end of this year 1673, Mr. Ray's 'Observations Typographical, Moral, &c.,' came forth, and therewith his 'Catalogus Stirpium in exteris Regionibus a nobis observatarum;' for the sake of which latter piece, in a great measure, it was that he published the former, because he thought the latter too small and jejune to go alone into the world.

About the same time also was published his 'Collection of Unusual or Local English Words,' which he had

gathered up in his travels through the counties of England. And the reason why he published them was, not barely because it was a new subject that might amuse the curious, but also be of good use to strangers that should have occasion to visit those parts, or have dealings there. And to make this book the more acceptable to the buyers as well as a little more bulky, he added to the first edition, a 'Catalogue of English Birds and Fishes, and the Way of Smelting and Refining such Metals and Minerals as England doth produce:' but the birds and fishes were left out in the second edition of this book, in the year 1691; by reason the catalogue was imperfect, and because Mr. Ray had not only published a better account of those animals, but also intended to draw up a methodical synopsis of all the English animals, together with the fossils: unto which useful undertaking he was solicited by some of his learned friends, particularly by Dr. Tancred Robinson.

In the year 1674 following, Mr. Oldenburg,* the

* Oldenburg, Henry, was born about the year 1626, in the duchy of Bremen. In 1653, or before, he came to London in the capacity of consul from the town of Bremen, but he does not appear to have held that office more than two years. In 1656 he became tutor to Lord Henry O'Bryan, a young Irish nobleman, whom he accompanied to the University of Oxford, and at the same time entered himself as a student, chiefly, it is supposed, in order to obtain access to the Bodleian library. He was afterwards tutor to Lord William Cavendish. While resident at Oxford, he became acquainted with several of the more eminent literary and scientific men of the time, among whom were Dr. Wallis, Ward, and the other originators of the present Royal Society. His acquaintance with Milton commenced somewhat earlier, as appears by Milton's letters to Oldenburg between the years 1654 and 1659, published in his 'Epistolæ Familiares.' In 1662 the Royal Society having obtained a charter of incorporation, Dr. Wilkins and Mr. Oldenburg were appointed secretaries to the Society. According to most biographers, the nominal appointment of Oldenburg was that of assistant secretary to Dr. Wilkins; but in the list of members who attended the first council held by the Society after its incorporation, (Thomson's 'History of the Royal Society,') we observe only one secretary specified, namely Oldenburg; and it is certain that those duties which demanded the greatest zeal and assiduity devolved exclusively upon him. In the 'General Dictionary,' (London, 1739, folio, art. Oldenburg,) there will be found several of his letters to Mr. Robert Boyle, who was one of his regular correspondents, and with whom he was always on the most friendly terms. The following extract from one of those letters, dated 17th December, 1667, shows that up to that time he had received no salary from the Society, and that his only emoluments were de-

Secretary of the Royal Society, (who had for some time intermitted the correspondence which he before had with Mr. Ray,) began now to renew it again, by letters sent almost every month. He was a very diligent secretary, and laboured very heartily to keep up the Society's correspondence, and get all the information he could about curious matters, from all persons that he knew, or heard were able to furnish him with any: and the better to accomplish his ends, he would send his ingenious correspondents an account of matters that came to his know-

rived from the publication of their Transactions. "I have some grounds to believe," he remarks, "that there are persons who think the Transactions bring me in a sufficient revenue; but I will make it out to any man that I never received more than 40*l.* a year upon this account (and that is little more than my house rent), and now by a new agreement I have been obliged to make, I shall not bring it to above 36*l.* a year at most. How strangely therefore I must needs shift for my subsistence, and with what distraction I must perform my tedious work, let any sober man judge." The following year Dr. Ward, then Bishop of Salisbury, suggested to the council of the Society the propriety of making some allowance to their secretary, observing that for his own part he was ashamed that Oldenburg should have been permitted to devote so much time and pains to the business of the Society without any consideration. The result of the application does not appear. The Transactions published by Oldenburg extend from No. 1, dated March 6th, 1664, to No. 136, dated June 25th, 1677, the year preceding his death. In 1675, he was accused by Hooke of not having done justice to him on the subject of the invention of spiral springs for pocket watches. The dispute which ensued was at length terminated by a declaration of the council, "that the publisher of the Transactions had carried himself faithfully and honestly in the managing of the intelligence of the Royal Society, and had given no cause for such reflections."

Oldenburg married the daughter of the famous John Dury, with whom he received an estate in Kent, valued at 60*l.* a year. His only child was Rupert, named after his godfather Prince Rupert. He died, according to most authorities, in 1678 (Thomson says September 1677), at Charlton, between Greenwich and Woolwich, where his body was interred.

He is author of a few short papers upon medical and other subjects in the 'Philosophical Transactions,' and also of some "twenty tracts, chiefly theological and political, in which he principally aimed at reconciling differences and promoting peace and unanimity." (Hutton.) He published, under the name of 'Grubendol' (an anagrammatised form of his real name), English translations of—1, 'Prodromus to a dissertation by Nich. Steno, concerning solids naturally contained within solids,' (1671, 8vo.;) 2, 'A genuine explication of the Book of Revelations, full of sundry new Christian Considerations;' 3, 'The Life of the Duchess of Mazarine,' from the French. It is also stated that he translated several of Mr. Boyle's works into Latin.

The letters of Oldenburg, dated in 1667, leave no doubt that during some part of that year he was confined to the Tower upon political grounds.

ledge, as well as expect a plentiful return from them: and such are the letters which Mr. Ray abundantly answered; some of which accounts Mr. Oldenburg published in the 'Philosophical Transactions,' as about St. Paul's battoons, the trochites of mushrooms, maize, the mischiefs of some poisonous plants, the bleeding of trees, and motion of their sap, spontaneous generation, musk-scented insects, the scolopendra, the acid juice of pismires, the darting of spiders, the anatomy of the porpus, the air-bladder in fishes, the macreuse,* and the wood-cracker; many or most of which particulars Mr. Oldenburg inserted in his 'Transactions.' But Mr. Oldenburg had a farther end in his frequent correspondence with Mr. Ray, which was to get him into the company of those leading diligent members,† who had made an agreement to entertain the Society with a philosophical discourse at their meetings, that so the burden might not lie on two or three, or a few members only; which request Mr. Ray readily complied with, and accordingly sent him a discourse concerning 'Seeds, and the specific differences of plants;' which Mr. Oldenburg, in his letter of December the 21st, 1674,‡ tells him was so well received by the president and those present, that they returned him their thanks, and desired him to let them have more of the like favours from him.

During this year (1674) and part of the next, Mr. Ray took a great deal of pains to prepare Mr. Willughby's observations about 'Birds' for the press.

These observations Mr. Willughby had rhapsodically written in Latin, as he did most of his other things, and for this reason, it was first published in that language, in the latter end of the year 1675. And although Mr. Willughby had done a gread deal, yet Mr. Ray was at no small labour to finish the book, by revising the whole, digesting it into order, and supplying from authors and his own observations what was wanting therein, Mr. Willughby not having had time to do it. For although

* See the Letters. † Ibid. ‡ Ibid.

he was a most indefatigable man, and had done more for his short time than could be expected, and carried his observations to a great degree of perfection, yet they required more polishing than it was possible for him to give them, by reason of his being snatched away (as I have said before) at a time of life the most proper for the finishing that part of the noble and useful design, which, by agreement between him and Mr. Ray, fell to his share; which was dispatching 'The History of Animals;' of which design it may not be improper here to give some account, which I shall do, as I had it from Mr. Ray himself, when I waited upon him at Black Notley, May the 15th, 1704, viz.:

These two gentlemen, finding the 'History of Nature' very imperfect, had agreed between themselves, before their travels beyond sea, to reduce the several tribes of things to a method; and to give accurate descriptions of the several species, from a strict view of them. And forasmuch as Mr. Willughby's genius lay chiefly to animals, therefore he undertook the birds, beasts, fishes, and insects, as Mr. Ray did the vegetables. And how each of these two great men discharged his province, the world hath seen in their works; which show that Mr. Ray lived to bring his part to great perfection: and that Mr. Willughby carried his as far as the utmost application and diligence of a short life could enable him.*

* The intimacy that existed between Willughby and Ray in the younger days of the latter, the nature of their pursuits, and other circumstances, so strongly remind one of the friendship that subsequently existed between Artedi and Linnæus, that I have been induced to make the following extracts from a notice of the former in the 'Biographical Dictionary.' Artedi, Peter, or Arctedius, Petrus, was born at Anund, in Sweden, on the 22d of February, 1705, the same year in which Ray died. As a boy he was fond of natural history and alchemy. In 1724 he was sent to Upsal, and there attended the lectures on philosophy and theology; but his love for natural history still continued, and his delight in alchemy had led him to the more rational pursuit of chemistry. His mind being now wholly engrossed with natural science, he gave up all thoughts of entering the church, and commenced the study of medicine,—a profession more congenial with his favourite pursuits. It was in 1728 that another young and ardent student of natural history went to study medicine at Upsal; this was Linnæus. He immediately inquired, as he tells us in the short and beautiful narrative he has given of the life of Artedi, who

And now, having mentioned the diligence of this great man, let me add, that it was such, and his labours so

of all the students was most distinguished for his medical knowledge. Without exception, all declared Artedi to stand preeminent. Linnæus longed to make a friend of him, but the illness of his father compelled Artedi to leave Upsal. He however soon returned, and then for the first time Linnæus saw him. He describes his person as tall and thin, with long black hair flowing over his shoulders, and a face strongly reminding him of the pictures he had seen of John Ray, the Englishman. With minds similarly constituted, both devoted to the same studies, and pursuing them under circumstances of difficulty, and sometimes even privation, these two young men soon formed an ardent friendship, which was only broken off by death. Having ascertained each other's acquirements, they laid down a plan of united study. All nature was to be their field; chemistry, mineralogy, and the higher forms of animals they studied together; the other departments they divided. To Linnæus was assigned the study of plants, insects, and birds; to Artedi fishes and reptiles. In this manner they pursued their studies; they made excursions together, they assisted each other, and each rejoiced at the other's success. The younger was not envious of the elder, nor the elder jealous of the younger, and few pages of biography record a more beautiful instance of friendship than this between Linnæus and Artedi. This friendship, however, was early interrupted by death. Artedi went to Amsterdam to assist an old apothecary named Albert Seba in describing his museum, and whilst returning late one evening from Seba's house, he fell into one of the canals, and the next morning was found drowned.

Linnæus had no sooner recovered the shock that the death of his friend had produced, than he hastened to secure his papers for publication, in order to fulfil a mutual testamentary obligation. He had, however, some difficulty; Artedi had not paid his rent, and Seba owed him no more than would pay for his funeral; it was only through the kindness of Dr. Clifford advancing money for their purchase from his landlord that Linnæus was enabled to gain possession of the manuscripts of Artedi. Linnæus having carefully revised all that Artedi had written on fishes, published it in an octavo volume at Leyden, in 1738, with the following title: 'Petri Artedi Sueci Medici Ichthyologia sive Opera omnia de Piscibus scilicet: Bibliotheca Ichthyologia; Philosophia Ichthyologia; Genera Piscium; Synonymia Specierum; Descriptiones Specierum. Omnia in hoc Genere perfectiora quam antea ulla. Posthuma vindicavit recognovit coaptavit et editit Carolus Linnæus, M.D., et Ac Imp. N.C.' Linnæus did not publish this work till after he had given to the world his 'Systema Naturæ," where he acknowledges how much he is indebted to the labours of Artedi for the perfection of the arrangement of the department of Ichthyology. Artedi had also assisted in other parts of this work of Linnæus. The only portion of the Ichthyologia which Artedi had left quite ready for the press was the Philosophia; the other parts were, more or less, revised by Linnæus.

It is almost impossible to estimate the value and importance of this work. It was all that it could be at the time when it was published. Willughby's work on fishes, which was published by Ray in 1686, was an immense advance in point of arrangement and the distinction of species, over every other previous work; but what the 'Historia Piscium' of Ray and Willughby was to the Pandects of Gessner and Aldrovandus, the 'Ichthyologia' of Artedi was to that work. The 'Ichthyologia,' in fact, establishes the science of ichthyology on those sound principles which have since been extended, but not in any manner changed.

incessant in his studies, that he allowed himself little or no time for those recreations and diversions which men of his estate and degree are apt to spend too much of their time in; but he prosecuted his design with as great application as if he had been to get his bread thereby; all which I mention, not only out of the great respect I bear to Mr. Willughby's memory, but for an example (as has been before recommended) to persons of great estate and quality, that they may be excited to answer the ends for which God gives them estates, leisure, parts, and gifts, or a good genius; which was not to exercise themselves in vain or sinful follies, but to be employed for the glory and in the service of the infinite Creator, and in doing good offices in the world, particularly such as tend to the credit and profit of their own families.

But to return to the 'Ornithology.' After Mr. Ray had published it, as I said, in Latin, he set about translating it into English, which, when he had finished, he published in the year 1678, with large additions, together with the figures of the birds, which Mr. Willughby's widow was at the charge of engraving. And, considering how well the engravers were paid for their labour, it is great pity they had not had some able person in London to have supervised them, that they might have given better likenesses to the birds than what most of them have. But this is what Mr. Ray could only complain of but not help, by reason of his being in Warwickshire, at a distance from London, where everything was transacted by letters, a method which could never afford sufficient directions in a matter of that nature.

Having given an account of the publication of the 'Ornithology' in 1675 and 1678, let us return again to the years 1675 and 1676, about which time the old Lady Willughby (mother of Mr. Francis Willughby) died, and Mr. Willughby's sons being removed from under Mr. Ray's tuition,* he thought it best

* How faithful he was in the discharge of his trust, and the great concern

to leave Middleton Hall, and retire with his wife to some other convenient place, and accordingly he removed to Sutton Cofield, about four miles from Middleton, where he continued till Michaelmas, 1677, and then removed into Essex, to Falborne Hall, not far from his native place, Black Notley.

he had for the welfare of his pupils, strongly appears from the following Latin instructions addressed to them:—

"Cum* educationis *vestræ* cura a piæ memoriæ parente (amicorum optimo) mihi delegata sit, præcipuaque pensi mei pars in moribus vestris ad normam a patre præscriptam formandis versetur, officii mei esse duxi, quæ mihi in mandatis dedit, *vobis* exponere; eaque, ut pro virili observare et implere annitamini, obtestari:—Ut virtutis, libertatis, et moderationis quamprimum per ætatem licet, principia, *vobis* instillem; literarum amorem et vehemens desiderium; laboris patientiam; otii, gulæ, libidinis, et omnigeni luxûs odium, detestationem, fugam *vobis* suadeam et ingenerem.

"Hæc cum per absentiam non licet auribus *vestris* vivâ voce insonare, saltèm, quod possum, literis consignata *vobis* ob oculos ponere, et ut rerum perpetuo memores esse *velitis*, orare non desistam.

"Cum autem te ad libertatem provocem, cavendum est, ne vocem eam aliter interpreteris, quam oportet; et in sinistrum sensum detorqueas:—Liber ergo est, qui divinis mandatis obtemperat, qui rationem ducem sequitur, qui pravorum affectuum jugum excussit, qui nec gulæ, nec libidini inservit, qui iræ, odio, et ambitioni dominatur; non qui, ut vult, vivit, nisi id velit, quod debeat, quodque rationi consentaneum sit; liber, qui

"'Nullius addictus in verba jurare magistri,'

aliena placita pro oraculis non habet, sed eorum dictata ad Lydium rationis lapidem exigit (de iis intellige, qui per ætatem et usum judicio valent, qui ingenio pollent): liber denique, qui nec alienæ voluntati in tantum se emancipavit, ut ejus jussa sine delectu omnia, justane an injusta fuerint parum solicitus, exequi paratus sit, legitimo tamen imperio in omnibus licitis, honestisque rebus promptè et libentèr obsequitur.

"Si hæc omnia observaveris, prout te observâsse spero, et confido; quæ dixi, non parænesis sed encomium sunt; nec reprehensionis sed laudis materiam continent, teque sereno et tranquillo animo esse jubent, et rectè factorum conscientiâ lætari.—Siquidem

"'Qui monet, ut facias, quod jam facis, &c.'

Tantùm ut, quo cæpisti pede, pergas; et ut indies magis, magisque perficias, consulendus es.

"Imprimis autem te vehementer exhortor, ut a malorum consortio abhorreas, nec iis unquam familiariùs utaris: memineris illius Apostoli

"'Φθειρουσιν ηθη χρηστα ομιλιαι κακαι.'

Verum, si qui pii sunt, et probi, modesti, ingeniosi, docti, illos tibi socios

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* The reader will observe that the first two paragraphs of these instructions are addressed to both the learned author's pupils.—G. S.

During his abode there, his mother, Mrs. Elizabeth Ray, died at Black Notley. She was a very religious and good woman, and of great use in her neighbourhood, particularly to her neighbours that were lame or sick, among whom she did great good, especially in chirurgical matters. Her death was much lamented by all sorts of persons in her neighbourhood.*

Mr. Ray having continued at Falborne Hall a year and three-quarters, on June the 24th, 1679,† he and his family removed to Black Notley, "where," saith he, in his remark on that removal, "I intend, God willing, to

asciscas, cum iis amicitiam colas, & libentissimè verseris, a quibus ipse aut doctior semper, aut melior possis discedere.

"Fastum omnem & superbiam ex animo ejicias: reputes tecum, quam stultum sit hoc vitium, quam rationi contrarium quam *Deo* et hominibus odiosum.

"Summopere exorandus es, ut pietatem exerceas erga parentes, aliosque sanguine conjunctos, quibus ætatis, dignitatis, aut gradûs respectu observantiam et reverentiam debes, ut eos debitis officiis colas eorumque monitis, consiliis, imo et reprehensionibus justis auscultes et obtemperes.

"Tandèm ut grato animo esse velis erga omnes, qui de te benè meruerint: —decorum, honestum, justum est, ut eos, qui te amore & benevolentiâ prosequuntur, qui fideli consilio, aut precibus apud *Deum* juverunt, qui beneficiis cumulârunt, ut eos, inquam, vicissim diligas, et affectu mutuo complectaris; ut paria facere contendas; imo ut cum favore beneficium reponas, et agros fertiles imiteris, qui multo plus reddunt, quam acceperunt.

"Hæc sunt, quæ tibi consulere officii mei esse duxi, ut ingrati, imo injusti notam effugiam; 'ut qui beneficium acciperem, officium autem non præstarem ullam:'—quæ, ut eodem, quo a me animo profecta sunt, accipias; eademque non ut monita mea, sed ut mandata paterna, imo divina respicias, et observes, rogo; meque habeas pro humilissimo et fidissimo tuo cliente et servo, "J. R."

* Concerning her, I find this note of Mr. Ray's, viz. "March 15th, 1678, being Saturday, departed this life, my most dear and honoured mother, Elizabeth Ray, of Black Notley, in her house on Dewlands, in the hall-chamber, about three of the clock in the afternoon, aged, as I suppose, seventy-eight; whose death, for some considerations, was a great wound to me. Yet have I good hope that her soul is received to the mercy of God, and her sins pardoned, through the merits and mediation of Jesus Christ, in whom she trusted, and whose servant she hath been from her youth up, *sticking constantly to her profession, and never leaving the Church in these times of giddiness and distraction.*"—G. S.

† Mr. Ray takes notice, that on July the 7th following, there fell the strangest hailstones he ever saw, being of extraordinary bigness, and of irregular figures, scarce any two alike; pellucid throughout like great pieces of ice, many of them having several long snags issuing out of the body of them. They fell in a great tempest of thunder and lightning.—G. S.

settle, for the short pittance of time I have yet to live in this world." And accordingly he made his words good.

Being settled at Black Notley, and by that means eased of the disquietude and interruptions in his studies, which he had met with the four or five last years, by his removal from place to place, he then began to resume his wonted labours, and particularly in Botany; and one of the first things he finished was his 'Methodus Plantarum nova;' which was published in the year 1682.*

* The nature and importance of this work have been well pointed out by Dr. Lindley in his notice of John Ray in the 'Penny Cyclopædia.' The following passage is interesting, as coming from one who, from his own labours, is well calculated to form a correct opinion of the value of the writings of Ray in systematic botany:—

"In 1682 appeared his 'Methodus Plantarum Nova,' 1 vol. 8vo, in which he proposed a new method of classifying plants, which, when altered and amended, as it subsequently was by himself at a later period, unquestionably formed the basis of that method which under the name of the system of Jussieu is universally received at the present day. In the formation of the principal groups into which he divided the vegetable kingdom, Ray derived his characters sometimes from the fruit, sometimes from the flower, and sometimes from other parts of the plant, as each in its turn seemed to offer the most strongly marked points of distinction. He first proposed the division of plants into dicotyledons and monocotyledons. 'Floriferas dividimus,' he says, 'in *dicotyledones*, quarum semina sata binis foliis anomalis seminalibus dictis quæ cotyledonum usum præstant è terra exeunt, vel in binos saltem lobos dividuntur quamvis eos supra terram foliorum specie non efferant; et *monocotyledones*, quæ nec folia seminalia bina efferunt nec lobos binos condunt.' (Methodus Plantarum, 2d edit. p. 2.) He extended these divisions both to trees and herbs, stating that palms differ as much in this respect from other trees, as grasses and lilies do from other herbs. Though he made these great discoveries and improvements, Ray obstinately continued in the old error of separating woody from herbaceous plants, or trees from herbs, and he held a long controversy with Rivinus on this point: he even went so far as to state that one of these divisions might be distinguished from the other by the presence of buds, which he says are only developed in woody plants. To him is due, however, the honour of the discovery of the true nature of buds, for he says that they are points at which new annual plants spring up from the old stock, but he stopped short in his discovery in not extending them to herbaceous plants. In the first edition of the 'Methodus' he formed twenty-five classes, taking the woody plants first, which he divided into trees and shrubs. In this system he fell into many errors, one of the most glaring of which, as he himself afterwards observed, was the separation of different species of corn from the other grasses. He subsequently altered this, and revised the whole arrangement, making thirty-four groups instead of twenty-five; many of which are almost exactly the same as are adopted by botanists of the present day under the name of natural orders.

The reason of Mr. Ray's setting about this work was this. He had for some years much signalized his skill in

The following table, taken from the second edition of his 'Methodus,' published in 1703, will give an outline of his system:—

Herbaceous plants and undershrubs not bearing buds.	Imperfect or without visible flowers	1. Submarine plants.
		2. Funguses.
		3. Mosses.
		4. Capillary.
	Perfect or flowering plants:—	
	Dicotyledones	5. Stamineous, i. e. Apetalous.
	Flower compound	6. Planipetalous, milky.
		7. Discoid with pappus seed.
		8. Corymbiferous.
		9. Capitale.
	Flower simple:—	
	With 1 naked seed	10. Monospermous.
	With 2 naked seeds	11. Umbelliferous.
		12. Stellate.
	With 4 naked seeds	13. Rough-leaved.
		14. Verticillate.
	With many naked seeds	15. Polyspermous.
	Seeds coated with pulp	16. Pomiferous.
		17. Bacciferous.
	In several distinct vessels	18. Multisiliquous.
	In a single vessel	19. Monopetalous and dipetalous plants.
		20. Siliquose.
		21. Leguminose.
		22. Pentapelatous.
	Monocotyledones, or grass-leaved:—	
	Bearing flowers	23. Bulbous or not bulbous.
	Without proper flowers	24. Stamineous grasses.
		25. Anomalous plants.
Trees or shrubs bearing buds.	Monocotyledones: with arundinaceous leaves	26. Palms
	Dicotyledones:—	
	Flowers remote from fruit (Monœcious or dicœcious)	27. Coniferous.
		28. Not coniferous.
	Flowers contiguous to fruit:—	
	Fruit	29. Umbilicated.
		30. Not umbilicated.
		31. Dry, not siliquose.
		32. Siliquose.
	Flower	33. Papilionaceous.
		34. Anomalous plants.

"This arrangement was too far in advance of the knowledge of the day, and the consequence was that it was little appreciated or adopted by his contem-

Botany, and was, therefore, by some of his learned friends, put upon writing a 'General History of Plants,' particularly the honorable Captain Hatton, a skilful botanist, recommended this work very earnestly to him; to whom, for this reason, Mr. Ray dedicated the first volume of his 'Histor. Plantar. Generalis;' which, after he had laboured at for some considerable time, the first volume was published in June 1686. And about the same time also the second volume was sent to the press, but was not finished there till the latter end of 1687.

To the compiling this history, many learned and ingenious men gave their helping hand; but none laboured more in it than Mr. Ray's two great friends, Sir Hans Sloane* and Dr. Tancred Robinson, who were perpetu-

poraries, and immediate successors, who, instead of improving the arrangement so ably sketched out, set about establishing others on artificial principles, all of which are rapidly sinking into oblivion, while the principles of Ray are tacitly admitted, and many of his fundamental divisions adopted in that beautiful but still imperfect natural system which has been formed by the labours of Jussieu, Brown, De Candolle, Lindley, and others."

* Sloane, Sir Hans, bart., was born at Killileagh, in county Down, on the 16th of April, 1660. Though a native of Ireland, he was of Scotch extraction, his father, Alexander Sloane, having been the head of a colony of Scots whom James I. settled in Ulster.

While young his health was delicate, and from his sixteenth to his nineteenth year he suffered from spitting of blood. It was, however, in his youth, and while living at home, that he imbibed a taste for those pursuits in the cultivation of which he afterwards attained such celebrity. As soon as his health would permit, he repaired to London, and during four years which he spent in the metropolis, devoted himself to the study of medicine and the collateral sciences. Strafforth, a pupil of the celebrated Stahl, was his instructor in chemistry, and his fondness for botany brought him acquainted with Ray and Robert Boyle. In 1683 he set out for Paris, and during his stay there attended the anatomical lectures of Duverney and those on botany by Tournefort. On his departure for Montpellier he was furnished by Tournefort with introductions to all the celebrated men at that university. Here he passed a year, spending much of his time in collecting plants, and, after having travelled through Languedoc with the same purpose, returned to London late in the year 1684.

He gave many of the plants and seeds which he had collected to Ray, who described them, and acknowledged his obligations to the donor in his "Historia Plantarum.' In 1685 he was elected a fellow of the Royal Society; and a fellow of the College of Physicians in April 1687. His attention had been excited when young by the descriptions of the wonderful productions of tropical climates, and the offer of the appointment of physician to the Duke of Albemarle, who was going out as governor to Jamaica, afforded him an opportunity of gratifying his curiosity. He accordingly set sail with the

ally, some way or other, aiding to the completion of the heavy work.

Neither did Mr. Ray take care only of his own books, but he continued to be mindful of what Mr. Willughby

duke on September 12, 1687, and after touching at many of the Caribbee islands, reached Port Royal on the 19th of December in the same year. The death of the duke soon after his arrival diminished Sloane's resources, and compelled him to hasten his return, though he did not leave Jamaica till he had formed in that and the neighbouring islands an immense collection of plants. He arrived in England on the 29th of May 1689, after a residence in Jamaica of only fifteenth months.

The plants which he brought with him amounted to 800 species. Of these he gave his friend Mr. Courten whatever he wanted to complete his collection, and the remainder, with other objects of natural history, formed the nucleus of his museum. He was appointed physician to Christ's Hospital in 1694, and held the office for thirty years; and in 1695 he married a lady of considerable wealth, Elizabeth, daughter of Alderman Langley, by whom he had four children, two of whom died young, while two daughters survived their parents, and carried their wealth to the noble families of Stanley and Cadogan.

In 1693 he was chosen secretary to the Royal Society, and in 1712 was elected one of the vice-presidents. The Academy of Sciences in Paris had conferred on him the title of a foreign associate in 1708. George I created him a baronet in 1716, and appointed him physician-general to the forces; he was elected president of the College of Physicians in 1719, and held the office till 1735. In 1727 he was appointed physician to the king, and in the same year had the honour of succeeding Newton in the president's chair of the Royal Society. He had purchased an estate at Chelsea in 1720, and retired thither in 1740, when eighty years old. His time was now passed in entertaining scientific men, and in examining the treasures he had collected. He died, after a short illness, on January 11th, 1753, in the ninety-third year of his age.

Sir Hans Sloane directed that at his death his museum should be offered to the nation for 20,000*l*., a sum which he says, in a codicil to his will, dated July 20th, 1749, did not amount to a fourth part of its real value. This collection, in the purchase of which by government the British Museum originated, was not altogether accumulated by Sir H. Sloane, but had been greatly increased by the bequest, in 1702, of the museum of his friend, Mr. Courten. At the time of his death, Sir H. Sloane's cabinet contained 200 volumes of dried plants, and 30,600 other specimens of objects of natural history, besides a library of 50,000 volumes and 3566 manuscripts. His fame however does not rest merely on his collection; he contributed many papers to the 'Philosophical Transactions.' Before he was appointed secretary to the Royal Society, the publication of these Transactions had been suspended for six years; he resumed their publication, and continued to superintend it till 1712. His great work was the 'Natural History of Jamaica,' which appeared in two volumes folio, with many plates, of which the first volume was published in 1707, and the second twenty years after. The first volume contains an introduction comprising a description of the island, its climate, products, and the diseases of its inhabitants, followed by an account of the plants indigenous there and in other of the West India islands; the trees

left behind him, particularly of what he had done about fishes; which, being noble materials, but indigested and confused, Mr. Ray was at no small trouble to put them into that complete order that was necessary for the press; which he had done about the year 1684, as he saith in a letter to Dr. Tancred Robinson, of February the 18th, 1684; where he tells him, that he had extracted out of Mr. Willughby's papers, revised, supplied, methodized, and fitted for the press, the 'Ichthyology,' and promised to send it to the Doctor; and it being accordingly soon after sent, it was by him communicated to the Royal Society, who, thinking so good a work worthy to be published, did, by the help of Bishop Fell,* get it printed at the theatre in Oxford, the Royal Society bearing the charge, and the cuts being engraved at the cost of divers worthy members of that illustrious body.

In July, 1685, this book was put to the press, and in April following it was finished and came abroad.

This 'History of Fishes,' as well as that of 'Birds,' (although the completest in their kinds of any extant) lost a great deal of their perfection by the unfortunate miscarriage of Mr. Willughby's and Mr. Ray's papers in their travels; who had very accurately described all the birds, fishes, &c. which they saw, as they passed through High and Low Germany, especially those in and upon the Danube and the Rhine; but lost them in their return from thence.†

Mr. Ray having now, for some years, betaken himself to a retired, studious, and sedentary way of living,

and animals are described in the second volume. He mentions in his preface that the whole undertaking had been submitted to Ray, and met with his approval, though it did not receive any emendations from him. A small Latin catalogue of the plants of Jamaica had been published by him in 1696, and serves as a sort of index to the large work. Notwithstanding his diligence in studying natural history, Sir H. Sloane appears not to have fully appreciated the benefits of scientific arrangement, and contents himself in his writings with referring plants to genera and species already known, and made no attempt to improve the very defective classification of that day.

* Fell, Dr. John, was born in Berkshire, in 1625. He was the brother-in-law of Dr. Willis. He was made Bishop of Oxford in 1675, and died July 10th, 1686.

† See Letters.

especially after his coming to Black Notley, began to suffer in his health, being often vexed with a troublesome diarrhœa, and, after some time, with eruptions in his legs, which were often very irksome to him, by their immoderate itching, and sometimes swelling and inflammation.*

By this time Mr. Ray's 'Catalogue of English Plants' was grown scarce, and was much called for; upon which he was greatly solicited, by his ingenious friends, to review and improve that book for a third edition, which he consented to. But there arising a difference between him and the booksellers, who had the right of the copy, concerning a third edition, and they, not without some ill behaviour, slighting that book and Mr. Ray's improvements, and threatening to trouble any who should dare to reprint it; this, I say, put Mr. Ray upon a better project, which was to publish it in another and better form, agreeable to the method of nature, viz., that of a 'Synopsis of English Vegetables,' fit for the pocket, and not in an alphabetical order, as his catalogue was. But to satisfy the importunity of his friends, he, instead of his catalogue, published his 'Fasciculus Stirpium Britannicarum, post editum Catalogum Plantarum, &c.' This was published in the year 1688, and therein he promised his 'Synopsis', which he accordingly got ready before the year was expired; but between the delays and tricks of the bookseller and printer, (especially of the latter,) it lay so long in the press, that Mr. Ray's friends in London had a suspicion that they intended to have stifled the book; but it was entirely finished at the press in May 1690, and published not long after.

This 'Synopsis Methodica Stirpium Britannicarum'

* About the first coming of them, he tells Dr. Tancred Robinson, in a letter of April the 8th, 1687, that "he was pretty well eased of his pain, and the pruritus was abated, which he could ascribe to nothing but the use of holyhock leaves boiled in May butter, with which he anointed the eruptions the night before; and wonders that such a simple ointment should not only abate the outward heat and itching, but remove the inward pain in the muscles."—G. S.

was very acceptable among all the botanists, and is to this day made their pocket companion on all their simpling occasions. And although Mr. Ray had added to, and much improved his 'Catalogues,' yet was not his 'Synopsis' so perfect, but to be capable of farther improvements. In order to which, many of our botanists sent him catalogues of plants he had omitted, and advertised him of such errors as he had made. By which means, as soon as this edition was sold off, another was published in 1696, with divers amendments, and an addition of above a hundred more species, together with a succinct history and method of the heretofore disregarded and neglected tribes of mosses, mushrooms, and sea-plants, called fuci.

But to return to the year 1690, where we left off. Mr. Ray having thus published many books, on subjects which he took to be somewhat alien to his profession, (which, as I said, was divinity,) to make some amends, as he thought, and entertain the world like himself, i. e. like a divine and a naturalist both, he set about his incomparable demonstration of the Being and Attributes of God, which he calls, 'The Wisdom of God manifested in the Works of the Creation;' the rudiments of which book were laid in some college lectures (called common-places) which he, when Fellow of Trinity, had read in the college chapel; and having much refined and enlarged these common places, and fitted them up for a convenient volume, he sent the copy to his old trusty friend Dr. Tancred Robinson, on March the 3d, 1690, to be disposed of by him as he thought fit; who soon put it into the bookseller's hands, and five hundred of them were accordingly printed and published in the year 1691.

This book was so well received by the public, that it soon got universal applause, and the impression was presently sold off, so that it came to a much greater impression the year following, and afterwards to other editions in 1701, 1704, 1709, and 1714, with large additions.

This book taking so well, and corresponding best with his profession as a divine, encouraged him to think of publishing another book of a like nature, whose foundation was also laid in Cambridge; and this was his 'Three Physico-Theological Discourses, concerning the Chaos, Deluge, and Dissolution of the World.' The substance of these discourses, or part of them at least, had been the subject of some sermons (as I have said) which he had preached at St. Mary's, before the University.

This book was finished at the press in December 1692, and was also, as the former, much bought up, so that it came to a second edition the year following; and this edition being sold off, the bookseller was, in the year 1703, very importunate with Mr. Ray to make additions to it for another impression, which he was prevailed upon to do, and having done it, he sent them to London, in April 1704. But the principal bookseller being at that time in a very ill state of health, and both he and his partner dying not long after, the book with its additions were laid aside, until the right of Mr. Ray's copies came into Mr. Innys's hands, who got me to look over this copy (I being well acquainted with Mr. Ray's papers) and to assist in the third edition, which came out in the year 1713.

As to the additions which Mr. Ray made to this, and indeed most of his other books, the chief reason was, because his hands were always full, and he uneasy till he had gone through his task; and withal being much advanced in years, and much afflicted with pain and troublesome ulcers in his legs, he chose rather to put out his things hastily in his life-time, than venture them, according to Horace's good advice,

> In metii descendat judicis aures,
> Et patris, et nostras; nonumque prematur in annum.
> Membranis intùs positis, delere licebit,
> Quod non edideris: nescit vox missa reverti.

But for his farther reasons and excuses for his additions, I refer to the prefaces of his two last-mentioned books.

Soon after these theological pieces were published, the 'Synopsis Methodica Animalium Quadrupedum,' &c., was ready for the press and sent to London, and given to the printers in January 1692, and by them finished in June following, 1693. For the writing of which history, the world is obliged to the often before commended Dr. Tancred Robinson, who, well knowing Mr. Ray's great abilities, and how acceptable and serviceable his 'Synopsis of Plants,' and his method of birds and fishes had been, thought a synopsis methodica of all animals, and indeed of fossils, and in short of all nature, would be of very great use; and, therefore, he put him upon this work. But a synopsis of this amplitude being too operose for one time, and such as would make a volume much too bulky for the pocket, Mr. Ray, therefore, first set upon the quadruped and serpent tribe; and having dispatched that, he set about a 'Synopsis of Birds and Fishes,' which having likewise dispatched, he sent it to Dr. Tancred Robinson, on February the 29th, 1693-4, who took all possible care to have it speedily printed, which was faithfully promised; but, either by the sloth or carelessness of the booksellers, who had gotten the copy, and had paid but a small matter for it, or for what other reasons is uncertain, they could not be prevailed upon to print it, notwithstanding threats, as well as entreaties and persuasions, were used to induce them to it; and so it lay suppressed for many years, insomuch as the copy was thought to have been destroyed or lost. But after Mr. Ray's death, Mr. Innys (who had purchased those booksellers' stock) happening to find the copy among a great parcel of other papers, put it into my hands, and I soon got it into the press, and had it published in the beginning of the year 1713.

In this Synopsis, Mr. Ray added many species of birds and fishes, which were omitted in Mr. Willughby's histories of them, and much reformed the method of the fishes. The additions were, chiefly, the birds of Mexico, and the birds and fishes of India, Spitzberg, Jamaica,

and those in the Leyden library, and, lastly, the whale kind about Scotland; to which I presumed, myself, to add the figures, and some small account of some birds and fishes, which the skilful Mr. Petiver* importuned me to insert.

When Mr. Ray had dispatched his 'Synopsis Methodica Avium et Piscium,' he thought he had finished his labours, and began to be much pleased with the thoughts of it: but at the same time 'Rauwolff's Travels'† were thought worthy of being translated into English and printed; the occasion of which was, that Rauwolff being a very judicious, as well as curious traveller, and having written his travels in High Dutch, and his book being grown very scarce, Sir Hans Sloane, Captain Hatton, and some other considerable virtuosos procured the book from the Royal Society (few besides having it), and got Mr. Staphorst to translate it into English; but it not being thought proper to trust the matter wholly to him, it was agreed to get Mr. Ray to revise and correct the translation, and to add a catalogue of such plants as grow in the places where Rauwolff had been; and accordingly Mr. Ray drew up such a catalogue for the purpose, viz., of Grecian and Syrian plants, and those of Egypt and Crete; which, with 'Rauwolff's Travels,' and some other scarce and curious tracts, were printed in 1693.

Having mentioned this 'Catalogue of Foreign Plants,' it reminds me to take notice next of his 'Sylloge Stir-

* Petiver, James, lived in London at the latter end of the 17th and beginning of the 18th century. He was a member of the Apothecaries' Company, and devoted himself with much zeal to increasing the collection of plants, and improving the garden which was held by that body at Chelsea. He made a large collection of plants and drawings of plants, which are still in the British Museum. He published many papers in the 'Philosophical Transactions' on various departments of natural history. These, with other works, were collected and published after his death, with the title "Jac. Petiver Opera omnia ad Historiam Naturalem spectantia," London, 1764, fol. He died in 1718.

† Rauwolff, Leonard, was a native of Augsburg, and died in Hungary in 1606. He travelled in the east and made a collection of plants. The travels referred to formed the first volume of a work published by Ray, under the title 'A Collection of Curious Travels and Voyages,' 2 vols. 8vo. London, 1693.

pium Europæarum extra Britanniam,' which he wrote about this time; the occasion of which was this, his 'Catalogus Stirpium in exteris Regionibus, &c.' being out of print, the booksellers were very pressing for another edition, with improvements, which Mr. Ray was minded to gratify them in; and, therefore, to the vegetables which he had himself observed, he added others that he had omitted in the places through which he had travelled. But his learned friend Dr. Tancred Robinson, not content herewith, persuaded him to make it more complete and useful, by taking in the vegetables of all Europe, growing out of Britain, and of all other parts, except India and America; by which means, travellers or others might know what vegetables they might expect in all places where they should come.

This book was published in the year 1694; about two years before which, Rivinus* published his 'Introduction' and presented Mr. Ray with it, and therein makes use of a different method from Mr. Ray's. And this 'Sylloge' being the next thing which Mr. Ray published, he took occasion in the preface to examine Rivinus's method, and showed the deficiencies of it; which Rivinus soon answered in November following, in a printed letter to Mr. Ray; wherein he useth great complaisance and civility to Mr. Ray in appearance, but could not forbear giving him now and then some angry strokes, and too superciliously and contemptuously runs down Mr. Ray's, and endeavours to establish his own method; which usage Mr.

* Rivinus, Augustus Quirinus, was born at Leipsic in 1652. He was educated and graduated in medicine in the university of his native city, and subsequently became appointed professor of anatomy and botany. The work, which attracted Ray's attention, and which procured for its author a high position amongst systematic botanists, was entitled 'Introductio generalis in Rem Herbariam,' and was published at Leipsic in 1690. He divided the vegetable kingdom into eighteen classes or orders, founded on the form of the corolla. This rendered his system very artificial, and on that account inferior to the one of Ray. The great merit of Rivinus's method consisted in the abolition of the distinction between trees and herbs, which formed a primary division of plants in the system of Ray. Rivinus commenced a great work, consisting of illustrations of his orders. He only lived to complete three of them. He died in 1725.

Ray showed some gentle resentment of, in a reply he made to Rivinus's letter; which was printed in 1696, together with a dissertation concerning method, in which he examines Monsieur Tournefort's, as well as Rivinus's method; who, in his 'Elements of Botany,' took frequent occasion to carp at and run down Mr. Ray's method. But, in the opinion of better judges than myself, Mr. Ray hath sufficiently answered all their objections against his method, and abundantly showed the imperfections and weakness, both of Dr. Rivinus's method,* which was taken from the number of petala in a flower, as also of Monsieur Tournefort's,† which was taken from the form and make of the flower.

But this contentious way of writing was by no means agreeable to Mr. Ray's sweet and peaceable nature, who, as he loved all men, so desired to be at perfect peace and unity with all; and his uneasiness on this account, I find

* See Letters.

† Tournefort, Joseph Pitton de, was born at Aix in Provence, on June 5th, 1656. He studied medicine at Montpellier, where Magnol was then professor. During his residence here, he acquired a taste for botany, and made many excursions in the Cevennes, Pyrenees, and Catalonia. He afterwards went to Paris, where he made the acquaintance of Fagon; and in 1683, he was appointed assistant-professor at the Jardin du Roi. In 1688, he was commissioned to travel through Spain and Portugal, and afterwards through Holland and England. On his return, in 1692, he was made a member of the Academy of Sciences. In 1700, he was appointed by the government to travel through Greece and Asia Minor, in company with the German physician, Gundelsheimer, and the painter Aubriet. He brought home with him upwards of 1300 species of new plants. He died on the 28th day of November, 1708. Tournefort published several works on botany, but the one demanding most notice is his 'Elémens de Botanique ou méthode pour connoitre les Plantes.' This was published at Paris in 1694, with 450 copper-plates. In this work he proposed a new arrangement of the vegetable kingdom, founding his classes or orders upon the presence or absence of the corolla, and using the form of the corolla, the union of the calyx with the fruit and other points, as characters of secondary value. This system was much more artificial than that of Ray, and called forth on that account his criticisms. To these, Tournefort replied, in a work, entitled 'De Optima Methodo Instituenda in Re Herbaria ad Sapientem Virum G. Sherardum Epistola, in qua respondetur Dissertationi D. Raii de variis Plantarum Methodis,' Paris, 1697, 8vo. The 'Elémens' was republished in Latin by Tournefort, in 1700, under the title 'Institutiones Rei Herbariæ.' It contained much additional matter, with an introduction, containing a history of botany, in which he speaks very highly of the labours of Ray.

in several of his letters to his friends, wherein he expresses himself in very strong terms on this subject.

These contests with Rivinus and Tournefort occasioned Mr. Ray to review and amend his own method; and accordingly he drew it up in a more complete form than he had done in his old 'Methodus Plantarum,' which was published in 1682, or than he had made use of in his 'Historia Plantarum.'

This new reformed method he finished in the year 1698, notwithstanding, at the same time, he was grievously vexed with a continual diarrhœa, and very painful ulcers in his legs, which ate deep into the flesh, and kept him waking whole nights; by which means he was so disabled from going to London, or anywhere among the physic-gardens (which was absolutely necessary to the perfecting his 'Methodus Nova') that he tells Dr. Tancred Robinson, in a letter of September the 30th, 1698, "he could not so much as walk into the neighbouring fields," &c.

This book, although finished in 1698, could not be printed without difficulty in four or five years after; for the London booksellers were unwilling to undertake it, so that Mr. Ray was forced to consult his learned friend Dr. Hotton, the botanic professor of Leyden, about it; who, with all readiness, undertook to have it printed in Holland, and was so earnest to get the copy over, that I find many importunate letters from him to Mr. Ray about it; and at last, having received the copy, he got the Waasbergs of Amsterdam to undertake it, who printed 1100 copies at Leyden (where Dr. Hotton lived,) that he might supervise the press.

The printers finished their task in 1703; and the Waasbergs (thinking it for their interest) had it said in the title-page, that it was printed at London, for Smith and Walford, who used to print Mr. Ray's things, and desired Mr. Ray's leave to say so; but he refused his consent, it being a manifest falsehood. However, they did it without his leave, pleading it to be their right, and

that it was customary among the printers to say what they thought would be for their interest in such cases.

This book was much approved of among foreigners, and Mr. Ray's method was much taught by some of the most eminent professors abroad, particularly Dr. Hotton himself, as he tells Mr. Ray in some of his letters; as in one of July the 3d, 1703: "In docendo, tuâ methodo utor, quod magno cedit emolumento rei herbariæ studiosis." And, in another of April the 18th, 1704: "Magnopere laudant methodum tuam amici, ad quos miseram, omnes. Inter eos Senator Venetus D. Martinelli, inconcussum pronunciat tuam Doctrinam: LA DOCTRINE (utor ejus Verbis) DU GRAND RAIUS EST INEBRANLABLE. Orbi dudum id perspectum, nihil a te proficisci posse, quod non sit elaboratum optimè, omnibusque numeris absolutum."*

Mr. Ray was a man of excellent natural parts, and had a singular vivacity in his style, whether he wrote in English or Latin, which was equally easy to him; all which (notwithstanding his great age, and the debility and infirmities of his body) he retained, even to his dying day; of which he gave good proof in some of his letters, written manifestly with a dying hand.†

In a word, in his dealings, no man more strictly just; in his conversation, no man more humble, courteous, and affable; towards God, no man more devout; and towards the poor and distressed, no man more compassionate and charitable, according to his abilities.

He died at Black Notley (in a house of his own building‡) January the 17th, 1704-5, and was buried (according to his own desire) in the church of that parish, where a

* Here the MS. of the life of Mr. Ray ends, but on a sheet of paper containing some farther observations on the same subject, I find also what follows, in Dr. Derham's own hand-writing.—G. S.

† See Letters, where we find the last letter Mr. Ray attempted to write; but in the postscript, "his strength failing him, he was forced to break off abruptly."—G. S.

‡ Now called "Dewlands," and in the possession of J. H. Pattison, esq., B.A., of Witham House, Witham, Essex.

small monument is erected for him, at the charge of some of his friends, with the following inscription :

Eruditissimi Viri JOHANNIS RAIJ, A.M.
Quicquid mortale fuit,
Hoc in angusto tumulo reconditum est.
At *Scripta*
Non una continet Regio:
Et Fama undequaque celeberrima
Vetat Mori.
Collegii S. S. Trinitatis Cantab. fuit olim Socius,
Necnon Societatis Regiæ apud Londinenses Sodalis,
Egregium utriusque Ornamentum.
In omni Scientiarum genere
Tam Divinarum quam Humanarum
Versatissimus.
Et sicut alter Solomon (cui forfán Unico Secundus)
A Cedro ad Hyssopum,
Ab Animalium maximis, ad minima usque Insecta,
Exquisitam nactus est Notitiam.
Nec de Plantis solùm, quà patet Terræ facies
Accuratissimè disseruit,
Sed et intima ipsius viscera sagacissimè rimatus,
Quicquid notatu dignum in universa Naturâ
Descripsit.
Apud exteras Gentes agens,
Quæ aliorum Oculos fugerent, diligentèr exploravit,
Multaque scitu dignissima primus in Lucem protulit:
Quod superest, eâ Morum Simplicitate præditus,
Ut fuerit absque Invidia Doctus:
Sublimis Ingenii,
Et, quod rarò accidit, demissi simul animi et modesti;
Non Sanguine et Genere insignis,
Sed quod majus
Propria Virtute Illustris.
De Opibus Titulisque obtinendis
Parum solicitus,
Hæc potius mereri voluit quam adipisci:
Dum sub Privato Lare, suâ Sorte contentus
(Fortunâ lautiori dignus) consenuit.
In Rebus aliis sibi modum facilè imposuit,
In Studiis nullum.
Quid Plura?
Hisce omnibus
Pietatem minimè fucatam adjunxit,
Ecclesiæ Anglicanæ
(Id quod supremo halitu confirmavit)
Totus et ex Animo addictus.
Sic benè latuit, benè vixit Vir beatus,
Quem Præsens Ætas colit, Postera mirabitur.

NOTE.

[The following notice of a recent visit to the tomb of John Ray, at Black Notley, will not perhaps be without interest to the readers of this volume.

"PILGRIMAGE TO THE TOMB OF JOHN RAY, THE NATURALIST, AT BLACK NOTLEY.

"The name of John Ray, which has long been widely known and as widely honoured by the man of science—and especially by the naturalist, who owes to him so much as the great master of his craft—seems to brighten with age, and shaking off the cobwebs of time, which, ere now, would have obscured merit less sterling, to render his lowly resting-place at Black Notley more attractive to the philosophic and learned pilgrim. Societies are springing up and spreading in honour of the man

> 'Who drew, with careful hand and curious eye,
> Truth from a flower, and wisdom from a fly;
> Who opened gates to nature's secret store,
> And science thron'd where error reign'd before;'

and this week we have to record a visit, or, as in more appropriate term we call it, a pilgrimage, of some of the wise and distinguished of the land to the tomb of the great lover of, and explorer into, the boundless beauties of nature's creative work. And, indeed, the great naturalist is worthy of all this. 'The name of Ray,' says a writer, 'will ever be revered by the wise and the good, from the use he made of his extensive knowledge of nature. His "Wisdom of God manifested in the Works of the Creation" was the first attempt, we believe, ever made in the Christian era to confirm the truth of revealed religion by facts drawn from the natural world. Another of his works, "Persuasive to a Holy Life," shows us also how deeply his pure and pious spirit was imbued with those truths he taught to others. None but a philosopher could have written the first, none but a Christian the second.'

"The party who visited all that remain—save his immortal works—of this foremost of our Essex worthies, was composed of members of the Linnæan Society, by whom this excursion to the spot, where the 'amiable and gentle Ray' first drew his breath, and where he closed the last years of his useful career, had been long contemplated. Wednesday was the day fixed for this interesting visit, and accordingly a party, consisting of the following gentlemen, left the metropolis by the first railway train in the morning, for Witham:—The Lord Bishop of Norwich, president of the Linnæan Society; Robert Brown, Esq., V.P.L.S.; Edward Forster, Esq., V.P.L.S.; Thomas Bell, F.R.S., Professor of Zoology, King's College; W. Yarrell, Esq., F.L.S., &c.;

J. J. Bennett, Esq., Sec. Lin. S. F.R.S.; Edward Forbes, F.R.S., F.L.S., Professor of Botany, King's College; D. T. Ansted, M.A., F.R.S., Professor of Geology, King's College; Edwin Lankester, M.D., F.R.S., F.L.S.; Richard Taylor, Esq., Sec. L.S.; James E. Winterbottom, M.A., F.L.S., &c.; R. H. Solly, M.A., F.R.S., F.L.S.; A. White, Esq., F.L.S., &c.; Joshua Milne, Esq., F.L.S.; and J. Van Voorst, Esq. F.Z.S.; R. Kippist, Esq., Lib. L. S.; C. Harrison, Esq., F.L.S.

"At Witham, the party were joined by J. H. Pattisson, Esq., who, with that hospitality and love of science which distinguish him, and being the proprietor of the house in which Ray spent his last days, invited these gentlemen to take luncheon beneath its roof—an invitation which was accepted with no little interest by the pilgrim party. They were also joined by Thomas Luard, Esq., J. W. Tomkin, Esq., and by three gentlemen from Saffron Walden—Thomas Spurgin, Esq., and Joseph and Joshua Clark, Esqrs., the latter of whom, we observe, in conjunction with Mr. G. S. Gibson, has published in the pages of the 'Phytologist' an account of a pleasing botanical trip to the same spot. Mrs. Pattisson and the Misses Luard were also present; and we have no doubt, had the visit admitted of more publicity, many a group of Essex men, and Essex maidens too, would have filled the rural highways and byways to Black Notley, to do homage at once to the memory of the man who reflects such lustre on their county, and to the living fame of those who thus gathered round his tomb. Proceeding in carriages to Black Notley, which is about six miles distant from Witham, the parties reached the village church about twelve o'clock. This edifice is an old plain tiled building, with rather a picturesque wooden spire, and stands in a delightfully rural situation. On the south side of the church rest the mortal remains of one of the greatest of Britith naturalists. The tomb is of a pyramidal form, from ten to twelve feet high, and is inscribed with an elegant Latin epitaph, from the pen of the Rev. William Coyte, M.A. It is in good preservation, but the inscription is rather illegible from the gnawing of time, and we understand that the Linnæan Society intend to restore that portion of it—and thus, like Old Mortality with his pious chisel, preserve it for future enthusiastic inquirers after the 'lettered stone.' This monument was, of course, the chief object of interest and attraction, and many lingered for a considerable time round the memorial of the distinguished dead, several copying the inscription, and Professor Forbes took a clever sketch of the scene. Many of the party visited the interior of the church in which Ray had been baptised—rambled about the village—or culled botanical specimens as an appropriate memento of their visit. The Bishop of Norwich appeared to take especial interest in the scene, making many inquiries as to the birth-place of the great naturalist.—His lordship was obliged to leave early, and after visiting Ray's residence, and partaking of Mr. Pattisson's hospitality, he proceeded to Witham to take the train to London.

"Having spent a pleasurable hour upon a scene where everything derived interest from the reflection that these fields had been traversed, and these paths trodden, and the botanical treasures of the neighbourhood ransacked in search of knowledge, by him who slumbered there, the party, about one o'clock, assembled at Dewlands, the house from which Ray's pure spirit took its final flight, in the year 1705. It is now a farmhouse, and is occupied by Mr. Wakeling, who, we were informed, was so alarmed at the threatened invasion of a large body of philosophers on his territories, that he had not been heard of from an early hour in the morning. Here the party sat down to an elegant cold collation, which had been most liberally provided by Mr. Pattisson, and at which that worthy gentleman and his lady presided. Due justice having been accorded to the viands,

"Mr. Pattisson proposed that they should drink to the memory of the honoured of the occasion, John Ray—which was done in reverential silence. Mr. Forster then rose and proposed the health of Mr. and Mrs. Pattisson, with many thanks to them for their kind hospitality. He alluded to the pleasure and satisfaction which he experienced at his present visit, entertaining, as he always had done, the highest veneration for John Ray, both as a scientific and a moral character. He (Mr. F.) could not better express his view of Ray's character, than by repeating what he had remarked of him at the last anniversary of the Linnæan Society—that he possessed piety with sincerity and without cant, and morality with consistency. When at Cambridge, such was his goodness of disposition, that he gained the respect of all parties.

"Mr. Pattisson, after thanking the company for the compliment paid to him, said, that he was truly gratified at the proceedings of that day in rendering homage to the greatest man Essex ever produced, one who was an ornament to their land, as well as to the whole world. Pleasing as the events of the day had been, he trusted that they would also have a useful result, especially to young persons, who, hearing of the homage paid to one who arose from humble life, might be led to study those pursuits which had immortalized Ray—he trusted his little boy (who had been present throughout the day) might profit by it. Mr. Pattisson then read the following extract from Mr. Ray's diary, to show the meek spirit of Christianity with which Ray was imbued:—

"'March 15, 1678, departed this life, my most dear and honoured mother, Elizabeth Ray, of Black Notley, in her house, on Dewlands, in the hall chamber, about three of the clock in the afternoon, aged, as I suppose, seventy-eight; whose death, for some considerations, was a great wound to me. Yet have I good hope that her soul is received to the mercy of God, and her sins pardoned, through the merits and mediation of Jesus Christ, in whom she trusted and whose servant she hath been from her youth up.'

"Mr. Pattison said, he would not trespass longer on their time, but he hoped

the company would drink the health of the Bishop of Norwich, whose talents as an ornithologist and entomologist were well known. The toast was drunk with great fervour, and the company, after exploring the old house, 'treading the very boards which Ray had trodden, and looking perhaps on trees and plants which Ray had admired,' returned to the White Hart Inn, Witham, where, about four o'clock, twenty gentlemen sat down to dinner, Edward Forster, Esq. in the chair, and R. Taylor, Esq. acting as vice-president. A variety of toasts were given, and at six o'clock the meeting broke up, and returned by the rail to London, carrying with them a pleasing, and, doubtless, it will be a long-cherished recollection of the day's excursion.

"We must not omit to mention, that the party assembled at Dewlands, before they separated, recorded their signatures in a work belonging to Mr. Pattisson, 'Derham's Life and Remains of Ray,' which will, doubtless, be treasured by Mr. P. as an interesting memento of the visit, and handed down to his latest posterity."—*Chelmsford Chronicle*, June 1845.]

PRAYERS.

The Editor* has been prevailed upon to add to Mr. Derham's life of this excellent man the following prayers and meditations, exactly copied from the originals in Mr. Ray's own hand-writing; the first two on occasion of the death of particular friends; the last two may be presumed to be the prayers he generally used, morning and evening.

I.

A Prayer upon occasion of Mr. F. W.'s *death.*

O LORD, thou hast been pleased to make a sad breach among us, to deprive us of our most dear friend and relation, a person that was to some of us as the very light of our eyes, the joy of our hearts, the greatest outward comfort of our lives. Give us a sanctified use of this heavy affliction; and when our hearts are moved and affected with a sense of our loss, give us to consider our sins, and to spend some part of our tears in lamenting them. Give us to consider the vanity and uncertainty of our lives, and the emptiness and insufficiency of all things here below, to satisfy the vast desires of our immortal souls. Comfort, O Lord, and support the hearts of thy servants, who have the greatest interest in this loss; and be thou pleased also to counsel and direct them. Give us all, upon this occasion, to consider our latter end, and to prepare for it; to wait all the days of our appointed time, until our change come; to consider that we can die but once, and after death comes judgment; that upon this moment depends eternity; that as the tree falls, so it lies; as death leaves, so shall judgment find us; as we spend a

* George Scott.

few days here, so it will be with us for ever hereafter; that we shall all appear before the judgment seat of Christ, to receive, according to what we have done in the body, whether it be good, or whether it be evil. Help us therefore to work, while we have the light and the day, because the night comes, in which no man can work; and to pass the time of our dwelling and sojourning here in thy fear. And for thy deceased servant, give us to imitate his meekness and humility, his temperance and sobriety, his exemplary chastity and purity, his dutifulness and obedience, his justice and righteousness, his faithfulness and constancy, his patience and submission to thy will, and all those other eminent graces and virtues, wherewith thou wert pleased to beautify and adorn his soul; that so we, together with him, may, after this life ended, be made partakers of thine everlasting kingdom and glory in the world to come.

II.

1673.—*About the latter end of November, we received the news of the death of* Sir Thomas Wendy, *of Haslingford, near Cambridge.*

Most holy and ever blessed Lord God, upon whom we have our constant and necessary dependence, and to whom, therefore, we owe all duty, service, and obedience, we bless thy holy name for all thy mercies hitherto continued to us; for our health, and peace, and liberty; for all the necessary supports and comforts of this present life, but more especially for thy spiritual mercies in things that concern a better life; for our redemption, by the precious blood of thy Son; for thy word and ordinances, the means of grace and salvation, the motions of thy Holy Spirit, and assistances of thy grace; and for thy patience and long-suffering exercised towards us. O Lord, we confess that we are less than the least of thy mercies, and have justly deserved, by reason of our sins, to have been long ago deprived of them all. We have violated and broken thy holy and righteous laws, omitting and neglecting those good duties which thou has commanded us, and by committing those evils which thou hast forbidden us. We have lived much under the power and command of our lusts and passions, of our sensual appetites and inclinations, and have not resisted them, nor striven against them, as we ought to have done. Our iniquities are gone over our heads as a burthen too heavy for us to bear; but there is mercy with thee, therefore shalt thou be feared; and thou art a God that hearest prayers, therefore unto

thee shall all flesh come; and thou hast said, if we confess our sins, thou art faithful and just to forgive us our sins, and to cleanse us from all unrighteousness. Have mercy upon us, O Lord, according to thy loving kindness; and after the multitude of thy tender mercies, blot out all our transgressions. Wash us from the guilt of our sins, in the precious blood of our Saviour Jesus Christ, and purge us from the stain and pollution of them, and sanctify us by the inhabitation of thy Holy Spirit. Let thy grace both instruct and enable us to deny ungodliness and worldly lusts, and to live righteously, soberly and godlily in this present world. Endue us with all the graces of thy Holy Spirit, a lively and operative faith, an awful fear and a reverence of thee, a fervent love to thee, and zeal for thy glory, with a firm hope and confidence in thee. Help us to live in the constant practice and exercise of [those Christian virtues] sobriety and purity, humility and charity; of justice and meekness, patience and contentedness. Help us to hate every evil way, and to love thy law, and delight therein. Give us to exercise ourselves in all things, so as to keep our consciences void of offence, both towards God and man. Assist us against all temptations, more especially those to which we are most liable [and which, heretofore, have prevailed most against us]; comfort us in all our adversities, support us under all our pressures, counsel and direct us in all our doubts and difficulties, and help us to persevere in a way of well-doing to our lives' end. For which end we pray thee fit and prepare us. Give us so to live every day as if it were our last, that so we may always have our loins girded about, and our lamps burning; that when we come to die, we may have nothing to do but to die, and resign up our souls into thy hands, as into the hands of a faithful Creator. With us be merciful to thy whole Church: do good, O Lord, in thy good pleasure to Sion; build thou the walls of Jerusalem; pull down and destroy the kingdom of Satan, and build up and advance the kingdom of thy Son. Be merciful to the people of this land, and those of the neighbouring nations. Be graciously pleased still to dwell among us, and to continue peace, and the gospel of peace to us. More especially we pray for a plentiful blessing upon thy servant, but our sovereign. Enrich his royal heart with all those gifts and graces that may fit and qualify him for the faithful discharge of his high trust and calling. Bless him in his person, in his relations, in his counsellors and officers. Bless all that have any places of power and authority under him, that they may faithfully serve him, and the public, according to the trust committed to them; and that they may employ their power and authority in the punishment of evil doers, and in the protection and encouragement of those that do well. [Give us all dutiful and obedient hearts to our governors and superiors.] Assist and succeed the labours of thy faithful ministers. Let thy Urim and Thummim be with thy holy ones. Give them to take heed, both to themselves and to

their doctrine, that they may save themselves and those that hear them. Pity and commiserate all thy afflicted servants, comfort all those that mourn in Sion, bind up the broken-hearted, visit the sick, relieve the oppressed, supply the wants of the needy, comfort the comfortless, be a father to the fatherless, and let not them be ashamed who have put their trust in thee. Be merciful to our friends and relations, and such as are near and dear to us; bless them in all their concernments and undertakings, and with all spiritual and temporal blessings. [Dwell in this family, and delight over us to do good; be thou the guide of youth, and the staff of the aged; season those that are young and tender among us with thy grace, give them such a portion of it, as may make them remember thee, their Creator, in the days of their youth.] Keep us, thy unworthy servants, the remaining part of this day in thy fear, watch over us by thy good providence, preserve us from all evil, both of sin and danger; sanctify our thoughts and meditations, our words and speeches, and all our actions and undertakings, that they may be always pleasing and acceptable in thy sight. Bless us in our going out and coming in, succeed and prosper us in all our lawful occasions and employments, and whatever we put our hand unto in thy fear. Help us to pass through things temporal, that we finally lose not the *things eternal*.

III.

The Morning Prayer.

Assist us, O Lord, in all good undertakings, in the services we are this day to perform. Help us to mind and intend the business we are about, to wait upon thee without distraction, and not to suffer our thoughts to wander about other objects, that we may not be of the number of those that draw near to thee with our lips, when our hearts are far from thee; but that we may serve thee with purpose of heart, with intention of mind, and with true zeal and devotion, that so we may offer up unto thee spiritual sacrifice, pleasing and acceptable, by Jesus Christ, our blessed Saviour and Redeemer.

IV.

An Evening Prayer.

O Lord, our God, the Father of Mercies, and God of all Consolations, by whose gracious providence it is that we, thy most unworthy servants, have been preserved this day, we desire to acknowledge thy fatherly goodness to us, and to offer up our evening sacrifice of praise and thanksgiving, for all thy undeserved mercies vouchsafed unto us; and with shame and sorrow do acknowledge and confess our manifold sins and transgressions. Thou didst, at the first, create us after thine own image, in knowledge, righteousness, and true holiness; but we, by our apostacy, have miserably defaced this thy image, and are become naturally prone to evil, and averse from good, and we have followed the bent and inclination of our corrupt appetites, gratifying and complying with our sensual and unreasonable desires, and giving ear to the temptations of Satan, and the allurements of this present evil world. [We have lived in the world, in a great measure without thee in the world.] Great hath been the vanity of our thoughts, the vanity and sinfulness of our words, and of all our ways. Our own hearts and consciences must needs condemn us, when we consider our lives past, and call to remembrance the vanities and follies of our youth, and the wickedness of our riper years; how much more then, thou art greater than our hearts, and knowest all things! O Lord, enter not into judgment with us, deal not with us after our deservings, neither reward us according to the evil of our doings. Give us a due sense of our sins past, affect our hearts with godly sorrow and contrition for them, and then be thou merciful to us in the free remission and forgiveness of them. Help us for the time to come to walk before thee in newness and holiness of life. Deliver us from the miserable bondage of sin, into the glorious liberty of the children of God. Convince us of the equity and reasonableness of thy ways, and of the beauty of holiness, that so we may be in love with them; of the deformity and unreasonableness of sin, that so we may hate and abhor it. Settle and establish us in a firm belief of every necessary truth; acquaint us with thy will and our duty; and whatsoever we ought to do, though never so uneasy to flesh and blood, give us grace, with all diligence, to set about the performance of it. Help us to deny ourselves, and to take up the cross and to follow thee, our blessed Saviour, God manifest in the flesh, to destroy the works of the devil. Assist us also, by thy grace, manfully to fight against our spiritual enemies, the devil, the world, and the corrupt flesh we carry about with us. The more weak we are, the more vigilant and watchful cause us to be, and the more careful to avoid the occasions of and temptations unto evil. Re-

new thine image in us, and make us partakers of the Divine Nature. Make us more spiritual, more heavenly-minded, more zealous for thy glory, more careful in all things, to serve and please thee, and more fearful to offend thee. Help us to grow daily in the knowledge of Jesus Christ, that so our last days may be our best days; and when thou shalt call for us out of this world, we may be ready to leave it, and die with a comfortable hope and expectation of eternal life and happiness. Let none of us be so hardened, through the deceitfulness of sin, as to put off our repentance till the time of sickness or old age, but give us grace to seek thee now, while thou mayst be found, and so call upon thee while thou art nigh, and to work while we have the light, because the night cometh in which no man can work.

THE

LIFE OF JOHN RAY, M.A. F.R.S.

BY

SIR J. E. SMITH.

(FROM REES'S CYCLOPÆDIA.)

LIFE OF JOHN RAY, M.A. F.R.S.

JOHN RAY, whom Haller terms the greatest botanist in the memory of man, and to whose transcendant merits we have already briefly adverted, in treating of the genus dedicated by Plumier to his name, see 'RAIANIA,'* was born at Black Notley, near Braintree, in Essex, November 29th, 1628. His father, Roger Ray, though in the humble station of a blacksmith, gave him a learned education; first, at the grammar school of his native town, at that time not very well conducted, and, subsequently, at Cambridge, where he entered at Catharine Hall, in his 16th year, June 28th, 1644, being designed for holy orders. In about a year and three quarters afterwards he removed to Trinity College, where he found the young men occupied in a more liberal train of studies, with less of scholastic disputations and quibbles. Ray was fortunate in having for his tutor at Trinity Dr. Duport, an eminent Greek scholar, under whose fostering and partial care he soon made up for all the deficiencies of his early education in the learned languages, including Hebrew. By this gentleman he was always mentioned with peculiar regard. He was no less happy in a youthful literary friend and fellow-student, afterwards the celebrated Dr. Isaac Barrow. Even at this early period Ray began to cultivate natural history, and distinguished himself by many school exercises as an orator, no less than by his general taste for study, his love of virtue, and his gentle-

* This article is reprinted, page 87.

ness of manners, qualities which shone brighter and brighter to the latest period of his life. His merit occasioned him to be chosen a minor fellow of Trinity, along with his friend Barrow, September 8th, 1649. On taking his degree of master of arts, he became a major or senior fellow, and afterwards, October 1st, 1651, Greek lecturer of the college. At the end of two years he was appointed mathematical lecturer, and in two years more, October 2d, 1655, humanity reader. He subsequently filled several respectable offices in his college, as junior dean, college steward, &c., and during his residence in the university, became tutor to many gentlemen of rank and fortune, who were sensible of their obligations to him; amongst whom, the most eminently distinguished by personal worth and congeniality of talents with himself, was Mr. Francis Willughby, of Middleton Hall, in Warwickshire, so well known by his posthumous works on birds and fishes, edited by the affectionate care of Ray.

At this period it was usual for young men of ability and learning, though not in orders, to deliver sermons and common-place readings as they were called, not only in the chapels or halls of their own colleges, but even before the University body at St. Mary's Church. In these Ray eminently distinguished himself. He was among the first who ventured to lead the attention of his hearers from the unprofitable subtleties of scholastic divinity, and the trammels of Aristotelian philosophy, to an observation of nature, and a practical investigation of truth. The rudiments of many of his subsequent writings originated in these juvenile essays, particularly his celebrated book on the 'Wisdom of God manifested in the Works of the Creation,' known all over the world by its numerous editions and translations, and universally admired for its rational piety, sound philosophy, and solid instruction. This book is the basis of all the labours of following divines, who have made the book of nature a commentary on the book of revelation; a confirmation of truths which nature has not authority of herself to establish. In it the

author inculcates the doctrine of a constantly superintending Providence, as well as the advantage, and even the duty of contemplating the works of God. "This," he says, "is part of the business of a sabbath-day, as it will be, probably, of our employment through that eternal rest, of which the sabbath is a type." Archbishop Tennison is recorded to have told Dr. Derham, that "Mr. Ray was much celebrated in his time at Cambridge for preaching solid and useful divinity, instead of that enthusiastic stuff which the sermons of that time were generally filled with." Two of his funeral discourses are mentioned with particular approbation; one, on the death of Dr. Arrowsmith, master of his college; the other, on that of one of his most intimate and beloved colleagues, Mr. John Nid, likewise a senior fellow of Trinity, who had a great share in Ray's first botanical publication, the 'Catalogus Plantarum circa Cantabrigiam nascentium,' printed in 1660, which may be considered as the prototype of his 'Synopsis,' hereafter mentioned. Indeed, before this little volume appeared, its author had visited various parts of England and Wales, for the purpose of investigating their native plants, as he did several times afterwards; nor were his observations confined to natural history, but extended to local and general history, antiquities, the arts, and all kinds of useful knowledge. His amusing Itineraries were published along with his life by Dr. Derham, and a few letters to that gentleman, by the care of Dr. George Scott, F.R.S., in 1760, under the title of 'Select Remains of the learned John Ray, M.A., &c.' Ray's first botanical tour occupied nearly six weeks, from August 9th to September 18th, 1658. On the 23d of December, 1660, he was ordained both deacon and priest at the same time, by Dr. Sanderson, then bishop of Lincoln. In 1661 he travelled with Mr. Willughby into Scotland, returning by Cumberland and Westmoreland; and the following year, with the same companion, he accomplished a more particular investigation of Wales. How critically he studied

the botany of the countries he visited, is evident from the different editions of his 'Catalogus Plantarum Angliæ,' and 'Synopsis Methodica Stirpium Britannicarum.'

All this while Mr. Ray continued to enjoy his fellowship and to cultivate his Cambridge connexions; but, in September, 1662, his tranquillity was disturbed by the too famous Bartholomew Act, by which two thousand conscientious divines were turned out of their livings, and many fellows of colleges deprived of their maintenance and means of literary improvement. Among the latter, was the subject of our memoir, with thirteen honest men at Cambridge besides, of whose names he has left us a list. One of them, Dr. Dillingham, was master of Emanuel College; but Ray was the only person of his own college who suffered this deprivation. The reader must not suppose that he, or perhaps any other person in this illustrious catalogue, was in the least degree deficient in attachment to the doctrine or discipline of the Church of England, or that they had taken the oath, called the Solemn League and Covenant, which Ray certainly had neither taken nor ever approved. They were required to swear to the infamous proposition, that the said oath was not binding to those who had taken it, and on this ground they conscientiously gave up their preferment. It is curious to read the apology made for Ray to Dr. Derham on this subject, by a Mr. Brokesby, —"that he was at that time absent from his college, where he might have met with satisfaction to his scruples; and was among some zealous nonconformists who too much influenced him by the addition of new scruples. And we may also ascribe somewhat to the prejudice of education in unhappy times." By this it appears that the "scruples" of nonconformists were most favorable to the sanctity of an oath; and that the "unhappy times" alluded to were more advantageous to principle than the golden days of Charles II, whose ministers, doubtless, valued the obedience far more than the honesty of any man; nor is this taste by any means peculiar to them or their profligate master.

Mr. Ray (or as he wrote his name for a while about this period, Wray,) having thus the world before him, made an arrangement with Mr. Willughby for a tour on the continent; and in this plan two of his pupils were included Mr. Nathaniel Bacon and Mr., afterwards Sir Philip Skippon. They sailed for Calais in April 1663; but being prevented by the state of political affairs from prosecuting their journey through France, they traversed the Low Countries, Germany, &c.; proceeding by Venice into Italy, most of whose cities they visited either by sea or land, as well as Malta and Sicily; and returned by Switzerland, through France, into England in the spring of 1666.

Mr. Willughby, indeed, separated from the rest of the party at Montpellier, and visited Spain. An ample account of their observations was published by Ray in 1673, making a thick octavo volume. The travellers appear to have been diligent and acute in every thing relative to politics, literature, natural history, mechanics, and philosophy, as well as antiquities and other curiosities; but in the fine arts they assume no authority, nor display any considerable taste or knowledge. Mr. Willughby's account of Spain makes a part by itself, and a rich critical catalogue of such plants, not for the most part natives of England, as were observed in this tour, concludes the volume. Haller gives to Ray the credit of having discovered several species in Switzerland previously not known as natives of that country.

Ray passed the summer of 1666 partly at Black Notley, and partly in Sussex, studying chiefly the works of Hook, Boyle, Sydenham on Fevers, and the Philosophical Transactions, "making few discoveries," says he, "save of mine own errors." The following winter he was employed at Mr. Willughby's, in arranging that gentleman's museum of natural history and coins, and in forming tables of plants and animals for the use of Dr. Wilkins in his famous work on an Universal Character. He now also began to arrange a catalogue of the English native plants

which he himself had gathered rather for his own use than with any immediate view of publication. "At present," as he wrote to Dr. Lister, "the world is glutted with Dr. Merret's bungling 'Pinax.' I resolve never to put out any thing which is not as perfect as is possible for me to make it. I wish you would take a little pains this summer about grasses, that so we might compare notes." The above resolution of our author is no doubt highly commendable, but the world has rather to lament that so many able men have formed the same determination, at least in natural science. If it were universally adhered to scarcely any work would see the light; for few can be so sensible of the defects of any other person's attempt to illustrate the works of nature as a man of tolerable judgment must be of his own. This is especially the case with those, who like Ray, direct their aspiring views towards system and philosophical theory. Happily he did not try this arduous path till he had trained himself by wholesome practical discipline in observation and experience. His first botanical works assumed the humble form of alphabetical catalogues. His and Mr. Willughby's labours in the service of Bishop Wilkins were indeed of a systematical description, and accordingly the authors themselves were more than any other persons probably dissatisfied with their performance. They relaxed from these labours in a tour of practical observation through the West of England, as far as the Land's End, in the summer of 1667, and returning by London, Mr. Ray was solicited to become a Fellow of the Royal Society, into which learned body he was admitted November 7th. Being now requested by his friend Wilkins to translate the 'Real Character' into Latin, he undertook, and by degrees accomplished that arduous performance; depositing his manuscript in the library of the Royal Society, where it has ever since reposed. The following summer was agreeably spent in visits to various literary friends, and in a solitary journey to the north, for his former companion Willughby, being just married, staid at home; there

Ray joined him in September 1668, and remained for most part of the ensuing winter and spring.

The seclusion and leisure of the country, with the converse and assistance of such a friend were favorable to the prosecution of a new subject of inquiry, which now strongly attracted the attention of our great naturalist—the theory of vegetation. The first step of the two philosophers in this little-explored path, was an examination of the motion of the sap in trees, and the result of their inquiries communicated to the Royal Society appeared soon after in the Philosophical Transactions. Their experiments clearly prove the ascent of the sap through the woody part of the tree, which is easily detected by boring the trunk at different depths before their leaves are unfolded, and they observed also the mucilaginous nature of the flowing sap, "precipitating a kind of white coagulum or jelly, which," says Ray, in a note preserved by Derham, "may be well conceived to be the part which every year between bark and tree turns to wood, and of which the leaves and fruits are made. And it seems to precipitate more when the tree is just ready to put out leaves and begins to cease dropping, than at its first bleeding." The accuracy of the leading facts recorded by these ingenious men is confirmed by subsequent observers, who have further pursued the same subject, which is now sufficiently well understood. They, indeed, like the rest of the world, till lately, seemed not to have suspected that the sap was quiescent till their perforations in the tree were made; nor did they advert as they ought to phenomena dependent on the principle of life in the vegetable body.

At this time Ray began to prepare for the press his 'Collection of Proverbs,' a curious book in its way, by which he is perhaps better known to the generality of his countrymen than by any other of his literary labours.

The first edition was published in 1672, but the work was subsequently much enlarged, and the author may almost be said to have exhausted his subject. From its

very nature, delicacy and refinement must often be dispensed with, but this is evidently not the fault or the aim of the writer. His learning and critical acuteness diffuse light over the whole, and make us overlook the coarse vehicle of our instruction.

The first edition of the 'Catalogue of English Plants,' already mentioned, came out in 1670, and the second in 1677. Their great author gave his work to the world with that diffidence for which he alone perhaps could perceive any just foundation. We postpone our remarks till we speak of the same work in its systematic form hereafter.

About this period the health of Mr. Ray seems to have been considerably impaired. He refused a tempting offer to travel again on the Continent as tutor to three young noblemen; nor could the powerful attractions of alpine botany, which made a part of his prospect, overcome the reluctance to leaving home, which arose from a feeble state of body. Indeed, this very reluctance or listlessness is accounted for by the turn which his disorder took, as it terminated in the jaundice. After this depressing complaint had left him he resumed with fresh alacrity his botanical travels at home, visiting the rich stores of the north of England with a companion named Thomas Willisel, whose name and discoveries he afterwards on many occasions has gratefully commemorated. Nothing forms a more striking feature in Ray's character than the unreserved and abundant commendation which he always gave to his friends and fellow-labourers. We are about to narrate an event which called forth all his affectionate feelings of this kind, as well as his most important and beneficial exertions; when even to his own prejudice he fulfilled the sacred duties of friendship, and delighted in adorning the bust of his friend with wreaths that he himself might justly have assumed. On the 3d of July 1672, Mr. Willughby was unexpectedly carried off by an acute disorder, in the thirty-seventh year of his age. The care of his two infant sons was confided by himself to Mr. Ray,

who was also appointed one of his five executors, and to whom he left an annuity of 60*l.* for life. The eldest of these youths was created a baronet at the age of ten years, but died before he was twenty. Their sister, Cassandra, afterwards married the Duke of Chandos. Thomas, the younger son, was one of the ten peers created all on the same day by queen Anne, and received the title of Lord Middleton. His early youth was much indebted to the care of his faithful guardian, who composed for his and his brother's use, and published in 1672 a 'Nomenclator Classicus,' far more exact, especially in the names of natural objects, than any that had previously appeared. The care of his pupils, and of the literary concerns of their deceased parent, now interrupted Mr. Ray's botanizing excursions, and caused him also to decline the offer of Dr. Lister, then a physician at York, to settle under his roof. Bishop Wilkins did not long survive Mr. Willughby, and his death made another chasm in the scientific and social circle of our great natural philosopher, who felt these losses as deeply and tenderly as any man. He sought consolation in a domestic attachment, fixing his choice on a young woman of good parentage, whose name was Margaret Oakley, and who resided in the family at Middleton Hall. He was married at the parish church, June 5th, 1673, being then in the forty-fifth year of his age, and his bride about twenty. This lady took a share in the early education of his pupils, as far as concerned their reading English. She is said to have been recommended by her character, as well as by her person, to the regard of her husband. She bore him three daughters, who with their mother survived him.

Ray's communications to the Royal Society became now very frequent, and extended to various subjects relative to the natural history of animals, as well as to the physiology, and even the botanical characters of vegetables. He was at the same time, in the course of the year 1674 and 1675, much occupied in digesting Mr. Willughby's zoological papers. These were composed in

Latin, in which language the "Ornithology" first appeared in 1676, making a folio volume, accompanied by seventy-seven plates, engraved at the expense of the author's widow, from his own drawings. An English translation by Ray, with still more additions than he had supplied to the former publication, and one more plate, issued from the press in 1678. The account which Dr. Derham received from the lips of Mr. Ray, about eight months previous to his decease, respecting the primary intentions of himself and his late friend, and which is recorded in his life, is too curious to be omitted here, as their project and its execution form an epocha in the history of natural science. "These two gentlemen," says Derham, "finding the history of nature very imperfect, had agreed between themselves, before their travels beyond the sea, to reduce the several tribes of things to a method, and to give accurate descriptions of the several species from a strict view of them. And forasmuch as Mr. Willughby's genius lay chiefly to animals, therefore he undertook the birds, beasts, fishes, and insects, as Mr. Ray did the vegetables." Derham adds that Mr. Willughby, during his short life, "prosecuted his design with as great application as if he had been to get his bread thereby." The writer of the present article has elsewhere observed, (Introductory Discourse Tr. of Linn. Soc. v. 1,) that "from the affectionate care with which Ray has cherished the fame of his departed friend, we are in danger of attributing too much to Mr. Willughby, and too little to himself." His own statement, no doubt, was correct as to their original aims, but it is impossible not to perceive that the survivor executed or perfected what his friend in many instances could only have projected or scarcely begun. Had Willughby lived there can be little doubt of his career being as glorious in the sequel as that of his friend, and possibly from the advantages of fortune which he enjoyed, even more widely beneficial to science. Yet who can tell that he might not have slackened his course? Though he gloriously avoided the snares of luxury and

folly in his youth, who shall say that politics or ambition might not have dazzled his riper age? or that he would always have escaped that ruinous vanity which grasps at universal knowledge, or rather at universal fame, and knowing nothing deeply, is most flattered with any praise which is least deserved. So often has this last been the case with literary men that one cannot but mistrust a character of the fairest promise. What Ray has done we know and can appreciate. Equal to his friend in learning, talents, and zeal, the advantages of ample fortune were compensated by the leisure and tranquillity of a sequestered country life. His duties went hand in hand with his studies and recreations, and he enjoyed, as Haller observes, the rare felicity of giving fifty years uninterruptedly to his favourite science. His long protracted studies and ripened experience enabled him to achieve what at first he could but regard at a distance as a great object of his wishes, a systematic arrangement of the animal as well as the vegetable kingdoms. Everybody had hitherto been content with Aristotle's classification of animals, of whose imperfections Ray, daring to think for himself, could not but be aware. He invented a new one, founded on the structure of the heart. "The Harveian experiments and doctrines of the circulation had called the peculiar attention of philosophers to every organ which has a share in that phenomenon; and to this cause, probably, we owe the method of Ray." The mode of breathing in animals, whether by lungs or by gills, and the single or double structure of the heart in the former case, constitutes the basis of his system, which in these particulars at least succeeding naturalists have adopted. His subordinate characters of the principal classes evince great skill and sagacity, and the Linnæan system of quadrupeds is highly indebted to that of our illustrious countryman.

His zoological publications, indeed, did not follow each other in rapid succession, for after the 'Ornithology' had come forth in English, eight years elapsed before the

'Historia Piscium' of Willughby was given by his care to the world. This was printed in folio, with 188 plates of fishes, in 1686, at Oxford, owing to the interest of Bishop Fell and the pecuniary assistance of the Royal Society. It does not appear why the relict of Mr. Willughby withheld in this instance the contributions which had so much benefited her husband's former work, and which she justly owed to his fame. It seems that the intimate connexion of Ray with this family was much impaired by the death of Lady Cassandra Willughby, the mother of his friend, about the year 1675 or 1676, when the children were taken from his tuition, and he left Middleton Hall, fixing, for a short time, at Sutton Cofield, four miles distant. At Michaelmas, 1677, he removed from thence to Falborne Hall, in Essex, not far from his native village. On the 15th of March following, his mother, at the age of 78, died at Black Notley, "in her house on Dewlands," of whom he speaks with that reverence and regret which has peculiarly marked the characters of some of the greatest and best men on the same occasion. At Midsummer, 1679, he finally settled at Black Notley for the remainder of his days, or "for the short pittance of time he had yet to live in this world," as he himself expressed it, which pittance, however, extended to more than twenty-five years.

The first fruit of our author's leisure and retirement was his 'Methodus Plantarum Nova,' published in 1682, making an octavo volume. His principles of arrangement are chiefly derived from the fruit. The regularity and irregularity of flowers, which take the lead in the system of Rivinus, make no part of that of Ray. It is remarkable that he adopts the ancient primary division of plants into trees, shrubs, and herbs, and that he blamed Rivinus for abolishing it, though his own prefatory remarks tend to overset that principle, as a vulgar and casual one, unworthy of a philosopher. That his system was not merely a commodious artificial aid to practical botany, but a philosophical clue to the labyrinth of nature, he probably,

like his fellow-labourers for many years in this department, believed; yet he was too modest and too learned to think he had brought this new and arduous design to perfection; for whatever he has incidentally or deliberately thrown out respecting the value of his labours, is often marked with more diffidence on the subject of classification than any other. He first applied his system to practical use in a general 'Historia Plantarum,' of which the first volume, a thick folio, was published in 1686, and the second in 1687. The third volume of the same work, which is supplementary, came out in 1704. This vast and critical compilation is still in use as a book of reference, being particularly valuable as an epitome of the contents of various rare and expensive works, which ordinary libraries cannot possess, such as the 'Hortus Malabaricus.' The description of species is faithful and instructive, the remarks original, bounded only by the whole circuit of the botanical learning of that day; nor are generic characters neglected, however vaguely they are assumed. Specific differences do not enter regularly into the author's plan, nor has he followed any uniform rules of nomenclature. So ample a transcript of the practical knowledge of such a botanist cannot but be a treasure; yet it is now much neglected, few persons being learned enough to use it with facility, for want of figures and a popular nomenclature; and those who are seldom requiring its assistance. A mere catalogue or index, like the works of Tournefort and Caspar Bauhin, which teach nothing of themselves, are of readier use. The 'Species Plantarum' of Linnæus unites the advantages of the clearest, most concise, specific definition, and, by the help of Bauhin, of a universal index.

But if the fame or the utility of Ray's great botanical work has neither of them been commensurate with the expectations that might have been formed, a little octavo volume, which he gave to the world in 1690, amply supplied all such defects, and proved the great corner-stone of his reputation in this department of science. We

speak of the 'Synopsis Methodica Stirpium Britannicarum.' The two editions of his alphabetical catalogue of English plants being sold off, and some pettifogging reasons of his booksellers standing in the way of a third, with any improvements, he remodelled the work, throwing it into a systematic form, revising the whole, supplying generic characters, with numerous additions of species, and various emendations and remarks. The uses and medicinal qualities of the plants are removed to the alphabetical index at the end. A second edition of this 'Synopsis' was published in 1696, nor did its author ever prepare another. The third, now most in use, was edited twenty-eight years afterwards, by Dillenius. Of all the systematical and practical Floras of any country, the second edition of Ray's 'Synopsis' is the most perfect that ever came under our observation. "He examined every plant recorded in his work, and even gathered most of them himself. He investigated their synonyms with consummate accuracy; and if the clearness and precision of other authors had equalled his, he would scarcely have committed an error. It is difficult to find him in a mistake or misconception respecting nature herself, though he sometimes misapprehends the bad figures or lame descriptions he was obliged to consult." (Tr. of Linn. Soc. v. 4, 277.) Above a hundred species are added in this second edition, and the cryptogamic plants in particular are more amply elucidated. A controversial letter from Rivinus to Ray, and its answer, with remarks upon Tournefort, are subjoined to this second edition. Much of the dispute turns upon the now obsolete distinction of plants, in a methodical system, into trees, shrubs, herbs, &c. The letters are well written in Latin; and liberal, though perhaps hypercritical, in their style. Ray took no delight in controversy. Its inevitable asperities were foreign to his nature. We must not omit to notice, that in the preface to both editions of his 'Synopsis,' the learned author, venerable for his character, his talents, and his profession, as well as by his noble adherence to prin-

ciple in the most corrupt times, has taken occasion to congratulate his country, and to pour out his grateful effusions to Divine Providence, in a style worthy of Milton, for the establishment of religion, law, and liberty, by the revolution which placed King William on the throne. An honest Englishman, however retired in his habits and pursuits, could not have withheld this tribute at such a time; nor was any loyalty ever more personally disinterested than that of Ray.

The year 1690 was the date of the first publication of his noble work on 'The Wisdom of God in the Creation,' of which we have already spoken, and whose sale through many editions was very extensive. In 1700 he printed a book more exclusively within the sphere of his sacred profession, called 'A Persuasive to a Holy Life,' a rare performance of the kind at that day, being devoid of enthusiasm, mysticism, or cant, as well as of religious bigotry or party spirit, "and employing the plain and solid arguments of reason for the best of purposes." His three 'Physico-Theological Discourses concerning the Chaos, Deluge, and Dissolution of the World,' of which the original materials had been collected and prepared formerly at Cambridge, came out in 1692, and were reprinted the following year. A third edition, superintended by Derham, was published in 1713. This able editor took up the same subject himself, in a similar performance, the materials of which, like Ray's, were first delivered in sermons at Bow Church, he having been appointed reader of Mr. Boyle's lectures.

While Ray was, from time to time, intent on these moral and religious performances, in which he laboured equally to impress and elucidate the truths of natural and revealed religion, as well as to enforce its precepts and duties, he was no less attentive than formerly to his systematical studies. Dr. Tancred Robinson is recorded, by Derham, as having first prompted our great naturalist to undertake a 'Synopsis Methodica,' or classical arrangement of the whole animal, as he had done of the vege-

table, kingdom. He even wished him to extend his attention to fossils, anticipating, in short, what Linnæus afterwards performed. Nor did he shrink from the task. Though now for some time oppressed with bodily infirmity, and particularly with very troublesome ulcers in his legs, his mind was tranquil and unimpaired. He soon finished his 'Synopsis Methodica Animalium Quadrupedum, et Serpentini Generis,' which came out in 1693, making a thin but closely-printed octavo volume. We have already spoken of the originality of his method. The volume in question, however, is not confined to dry systematical arrangement. It enters deeply into the general and particular history of animals, their external forms and internal structure, with abundance of entertaining and curious facts and observations. Linnæus was possessed of this book from the year 1734, and appears to have studied it well. A similar volume on birds, and another on fishes, were prepared by the author; but the manuscripts of these lay neglected in the hands of some careless or ignorant bookseller, till they were discovered by Dr. Derham, and published in 1713. They contain more of particular descriptions and histories than of general remarks, but otherwise accord with the plan of the Synopsis of quadrupeds. Many things are supplied from materials obtained since the publication of Willughby's 'Ornithology' and 'Ichthyology,' and several figures of fishes were added by Derham, at the persuasion of Petiver, whose works they somewhat resemble.

Having accomplished so many great and laborious publications, our venerable naturalist began, as Dr. Derham informs us, to enjoy the thoughts of reposing from his labours. He was nevertheless ready, at the call of his friends, to revise a translation of Rauwolff's Travels, the original having even then become very scarce, besides being unintelligible to mere English readers. This translation, with some other rare tracts annexed, and a catalogue of Grecian, Syrian, Egyptian, and Cretan plants, drawn up by Mr. Ray, issued from the press in 1693.

Possibly the 'Stirpium Europæarum extra Britannias nascentium Sylloge,' which appeared in 1694, originated in the author's attention being recalled by the last mentioned publication to the contemplation of exotic plants. In this volume he collects from Clusius, Bauhin, Columna, and others, various additions to his own discoveries, and the whole are disposed in alphabetical order. A geographical view of plants, which he had himself gathered in his foreign travels, is subjoined; and the volume concludes with alphabetical catalogues, selected from Boccone's Sicilian plants and other recent authors. It is in the preface to this book that he first adverts to the system of Rivinus, not without just applause of that author's work, a copy of which had been presented to Ray. He commends the apt distribution of the genera, the clearness and conciseness of the style, the purity of the Latin, and the beauty as well as exactness of the plates. He, however, contends for the ancient distinction of plants into trees and herbs, which, as we have seen, he had himself mentioned as unphilosophical. In the rest of his criticisms, though "much may be said on both sides," and though these controversialists, like others, profit by the intricacies and anomalies of nature to make good their arguments, concealing themselves, like the cuttle-fish, in their ink, still we cannot but give our testimony to the greater solidity of Ray's principles, as derived from the fruits and seeds of plants, than to the seemingly more elegant ones of Rivinus, deduced from the flower, which last undoubtedly lead, in their practical application, to some paradoxical combinations. But on this subject we may say more in its proper place. In this preface Ray points out the importance and use of the stamens and pistils, succinctly explaining the sexual doctrine as now universally admitted.

One advantage arose from the epistolary altercation of Rivinus and Ray, that it led the latter to revise his own system, and to republish it in an improved state. Happy if such were more generally the fruit of contention, that

each party should correct himself, instead of aggravating the defects of his adversary. Some notice is taken in the preface to this edition both of the system of Tournefort and that of Hermann, which last was much congenial to the principles of Ray. The work was finished in 1698, but not given to the public till 1703, recourse having been had to a Dutch bookseller, who thought it for his interest to place an English publisher's name in the title-page, a proceeding which, however harmless, shocked the honest feelings of the author, and this, perhaps, excited the thrifty Hollander's surprise. By his exertions, however, the book and the fame of its author became more widely diffused, and continental botanists were much further initiated into Ray's system than they had previously been.

But now the mortal career of this eminent man was drawing towards a close. He complained in his letters, that so far from being able to visit the London gardens as he wished, in order to make observations upon plants, for the greater perfection of this last edition of his 'Methodus,' he was not able to walk into his neighbouring fields. He still, nevertheless, kept up to the last his correspondence with his friends, in the vivacity and clearness of style which was natural to him. Latin and English, it is said, were equally ready to his pen. So indefatigable was he in the cultivation of the study of nature, that within a year or two of his death he began to collect his scattered notes for a work on insects, and actually drew up a 'Methodus Insectorum,' which was printed, soon after his decease, in a little octavo of sixteen pages, and republished in the front of his 'Historia Insectorum.' This last book, comprising all his own and Mr. Willughby's descriptions of insects, came from the press in 1710, at the expense of the Royal Society, and under the superintendence of Dr. Derham. It consists of 375 quarto pages, besides an appendix of 23 more, on British Beetles, by Lister. Ray attributes to Willughby that part of his system which concerns insects supposed to undergo no metamorphosis. These are mostly the aptera of Linnæus, excluding the

crustacea, but admitting intestinal vermes, earthworms, and even leeches. All the descriptions and remarks of his departed friend are marked with the initials F. W. This work is a mass of accurate and authentic observation, but for want of plates has never come into popular use. Linnæus studied it much, and has often cited the descriptions, the appropriation of which is, however, too difficult and uncertain to render them of general or extensive service. Those which regard the Lepidoptera and their caterpillars are most copious.

The study of insects was probably the last that engaged the attention of this great and wise man, who, though on the verge of eternity, in the full possession of himself and in the anticipation of the most glorious manifestations of his Creator, did not disdain or neglect to contemplate him in his least and lowest works. Such an example might serve for an occasional answer to those who affect to think the study of any of the works of God below the dignity of their philosophy; for the most inordinate vanity must look with respect on what formed the abstruse studies of so distinguished a person as Ray. His last letter to Dr. Derham, who had just been to visit him, is dated August 16, 1704. He speaks of having lately obtained Mr. Willughby's entomological papers, and describes himself as then entering on his 'History of Insects.' How well he employed his time during the autumn is evident from what we have related concerning this work, for he never saw another spring. He died at Black Notley, in a house of his own building, Jan. 17, 1705, in the seventy-seventh year of his age. His character is thus concisely given by Derham: "In his dealings no man more strictly just; in his conversation no man more humble, courteous, and affable; towards God no man more devout; and towards the poor and distressed no man more compassionate and charitable, according to his abilities."

The friend who wrote this eulogium in his 'Life of Mr. Ray,' asserts that he was buried according to his own

desire, in the church of Black Notley, but the authors of the 'Biographia Britannica' are probably more correct in saying that he declined the offer made him by the rector of a place of interment in the chancel, choosing rather to repose with his ancestors in the church-yard. He perhaps thought, with bishop Hall, that "the house of God ought not to be made a repository for dead carcases." However this might be, the latter account is confirmed by the original situation of his monument, erected at the expense, in part at least, of bishop Compton. The long and elegant Latin epitaph has often been published. Its author was the Rev. William Coyte, M.A., father of the late Dr. Coyte, of Ipswich, and the original manuscript is now before us, containing the information that Ray was interred in the church-yard. In 1737 the monument in question, which seems to have been a sort of altar-tomb, being nearly ruined, was restored at the charge of Dr. Legge, and removed for shelter into the church, where therefore it became a cenotaph, as an inscription added on this occasion terms it. Forty-five years afterwards the tomb again underwent a repair, by the care of the present Sir Thomas Gery Cullum and others, who subjoined a third inscription, as follows:

Tumulum hunc,
a nonnullis humanitati, et scientiæ
naturali, faventibus,
olim conditum,
et aliorum bonâ diligentiâ
posteà restauratum, 1737,
nunc e vetustatis situ et sordibus
pauci de novo revocarunt, 1792.
ανδρων επιφανων πασα γη ταφος.

A more lasting monument was dedicated to the memory of our great English naturalist, in the genus of plants which bears his name.* The opinion we have there in few words expressed of his high rank in botanical science it is hoped the present more diffuse account will justify. It must be lamented that he made, as far as we can learn, no collection of dried plants which might serve to ascer-

* See page 87.

tain in every case what he described. The great herbariums of Buddle, Uvedale, &c., still kept in the British Museum, are indeed supposed to supply in a great measure this defect; they having been collected by persons who had frequent communications with Ray, and were well acquainted with his plants. Whatever he had preserved relative to any branch of natural history, he gave a week before his death to his neighbour, Mr. Samuel Dale, author of the 'Pharmacologia.' Nothing is said of his library, which was probably inconsiderable. His pecuniary circumstances were very limited, for he merely conformed as a layman to the church of England, and was unwilling to subscribe what was requisite for receiving preferment. He is recorded, nevertheless, to have disapproved of separatists from the national church, justly disgusted, probably, by the contentions and fanaticism he had seen throughout the greater part of his life. His principles and feelings soared far above the fastidious distinctions which marked the orthodox or the heterodox of those times, and his mind was uncontaminated with their passions. His good sense might well lead him to regret that those who had so lately escaped a most tremendous common enemy should be so prone to quarrel amongst themselves. It is an honour to both these parties that they have been emulous to claim him as their ally.

In the preceding review of the literary productions of Ray, more numerous, as Haller says, than those of any other botanist, Linnæus excepted, we have been obliged to pass over several things of less note; such as his lists of native British plants, for Gibson's edition of Camden's 'Britannia,' and even a variety of communications to the Royal Society. Neither have we touched on the principles of his botanical system, that subject being explained at length by our predecessor, the late Rev. Mr. Wood, under the article "Classification."* Those who are anxious to peruse a more full and critical investigation of his works and studies than it has been possible to give in this place,

* In Rees's Cyclopædia.

will do well to consult Dr. Pulteney's 'Sketches of the Progress of Botany in England.' The 'Philosophical Letters,' collected and published in 1718 by Dr. Derham, containing sixty-eight written by Ray, and many more by his correspondents, throw much light on his character and pursuits. We cannot help remarking that his handwriting was peculiarly fair and elegant. A specimen of it exists among Sir Henry Spelman's vast and curious collection of manuscripts, now in the possession of John Patterson, esq. late M.P. for Norwich.

The portraits of Ray are not numerous. One in oil, taken at an advanced period of his life, remains in the British Museum, and Dr. John Sims is possessed of a miniature of an earlier date, of which its owner has given an engraving by way of frontispiece to the first volume of the 'Annals of Botany,' published in 1805. The latter is rather deficient in that strength of character which appears in the more common prints after a picture by Faithorne, often prefixed to the third edition of the 'Synopsis,' and sometimes to the 'Historia Plantarum.' One of these prints was engraved by Elder, the other by Vertue. Neither of them is strictly appropriated to any particular book. That in the German edition of his 'Wisdom of God in the Creation,' published at Leipsic in 1732, appears to be copied from one of these, and yet it is so unlike them in expression, that if it were possible one would suppose it taken from some other portrait of the same person. (Ray's Works. His Life, by Dr. Derham. Haller's Bibl. Bot. Pulteney's Sketches. Aikin's General Biography.)—S.

DESCRIPTION OF

THE GENUS RAIANIA

AND ITS SPECIES.

[The following is the article alluded to at page 65, and is from the pen of Sir J. E. Smith, and will not be considered out of place in these 'Memorials,' as giving an account of the species of the genus of plants which has been dedicated to our great botanist.]

Raiania in botany, so called in honour of our immortal naturalist, John Ray, the most accurate in observation, the most philosophical in contemplation, and the most faithful in description, of all the botanists of his own, or perhaps any other time. Plumier, who established this genus, finding the name *Raia* preoccupied by zoologists, contrived to call the plant *Jan Raia*, which Linnæus turned about into *Rajania*, still retaining the idea of the christian name combined with the other. But such an idea is ludicrous to English ears, and is happily not in general perceived. We presume to alter the orthography in one letter, writing the word as it is always pronounced, and deducing it regularly from the Latin *Raius*, by which name the person commemorated is known all over the literary world. (Plum. Gen., 33 t. 29. Linn. Gen., 525. Schreb., 692. Willd. Sp. Pl., v. 4, 788. Mart. Mill. Dict., v. 4. Ait. Hort. Kew., v. 5, 391. Jus., 43. Lamarck. Illustr., t. 818. Gærtn., t. 14.)

Class and order Dicœcia Hexandria. Nat. Ord. *Sarmentaceæ* Linn.; *Asparagi* Juss. [*Dioscoreæ* Brown.]

Gen. Ch., Male. Cal. Perianth, bell-shaped in six deep oblong pointed segments, most spreading in their upper part. Cor. none; Stam. filaments six, bristle-shaped, shorter than the calyx; anthers simple. Female. Cal. Perianth superior, of one leaf, bell-shaped in six deep segments, permanent; withering. Cor. none. Pist. germen inferior, compressed, with a prominent border at one side, three-celled; styles three, the length of the calyx; stigmas obtuse Peric. Capsule membranous of three cells, without valves, crowned by the calyx; two of the cells barren, almost obliterated, without wings; the third fertile, compressed, extended into a very large half ovate membranous wing. Seed solitary, nearly elliptical compressed.

Ess. Cha. Male. Calyx in six deep segments; corolla none. Female. Calyx in six deep segments; corolla none. Styles three. Capsule membranous with one wing. Seed solitary.

Section 1. Leaves simple.

1. *R. hastata.* Halberd-leaved Raiania. Linn. Sp. Pl., 1461. — (*Jan. Raia scandens, folio oblongo, augusto et auriculato*, Plum. Gen., 33. *Bryonia fructu alato foliis auriculatis*, Plum. Amer. 84, t. 98.) Leaves hastate, somewhat heart-shaped at the base. Gathered by Plumier, about Port de Paix in the island of Hispaniola. Root perennial, sometimes large and ovate, sometimes four or five inches long, and two thick, round at each end like a sausage. Its substance resembles that of a radish, without any internal fibres; the bark thin, ash-coloured, a little rugged and warty; the flesh very white, tasting like a bean. This root throws up only one very slender long

climbing smooth knotty stem, thickest at the base, where it is accompanied by several fibrous radicles. We presume it to be annual. Leaves scattered, spreading on short stalks smooth and membranous, about three inches long, heart-shaped, dilated, abrupt, and seven-ribbed at the base; then suddenly elongated into a nearly linear, entire, central, three-ribbed lobe, bluntish, with a small point, the under side paler and rather downy. Stipulas in pairs awl-shaped, minute. Flowers small whitish, in simple axillary drooping clusters. Bracteas minute, ovate, acute, solitary at the base of each partial stalk. Fruit, as Plumier says, "like half that of a maple tree, of a silvery hue when young, but afterwards tawny."

R. cordata. Heart-leaved Raiania. Linn. Sp. Pl., 1461, Ait n. 1.—(*Jan Raia scandens foliis tamni* Plum. Ic., 148, t. 155, f. 1.) Leaves ovate, somewhat heart-shaped at the base, seven ribbed. Native of the West Indies, from whence it was sent to Kew gardens in 1786, by Mr. Alexander Anderson. It flowers in the stove in July, and we cannot but wish some accurate botanist would publish a good figure and description of the plant, out of respect to its name. Plumier represents the habit of the root, stem, &c., much like the foregoing; but the leaves are regularly ovate, pointed more or less heart-shaped at their base, and furnished with seven ribs continued from that part to the point. These ribs are connected by numerous transverse veins. Inflorescence, flowers, fruit much as in *R. hastata*, but having seen no specimen, we can say nothing respecting the stipulas or bracteas, none of which are noticed in the plate.*

R. ovata. Ovate-leaved Raiania. Swartz, Ind. Occ., v. 1, 638. Mart. Mill. Dict., n. 4.—"Leaves ovate pointed, three ribbed." Native of bushy places on the hills

* It is this species which is figured, and forms the upper part of the wreath of plants encircling the head of Ray, in the common title-page of the works of the RAY SOCIETY.

three-ribbed leaves, about three inches long on short foot-stalks; the clusters are represented not axillary as in the others, but lateral and alternate from the spaces of the stem between the joints.

Section 2. Leaves compound.

6. *R. quinata.* Five-leaved umbellate Raiania. Thunb. Jap., 148, Mart. n. 6. Leaves five on a common stalk, emarginated. Umbels axillary. Observed by Thunberg about Nagasaki, and in Kosido in Japan, flowering in April and May. The Japanese call this plant *Fagi Kadsurer* and *Akebi.* Stem twining, round, smooth, ash-coloured, branched. Leaves several together, axillary, stalked smooth, of five separately stalked, umbellate, ovate, entire leaflets, each from three-quarters of an inch to an inch in length, partial, half as long as the finger nail. Flowers in umbels from the same buds as the leaves, on slender stalks as long as the foot-stalks; partial stalks capillary, the length of the nail. This species differs from the last, in having compound leaves and umbellate flowers. (Thunberg.)

R. hexaphylla. Six-leaved clustered Raiania. Thunb. Jap., 149, Mart. n. 7. Leaves six on a common stalk, oblong, acute. Flowers racemose. Native of the country of Fakonia in Japan, among bushes, flowering in April. Its vernacular names are *Ahebi, Mbe, Kadsura,* and *Tsu So.* The stem is round, striated, smooth climbing. Leaves alternate smooth, six on a stalk, umbellate on slender partial stalks, oblong, acute, entire veins two inches long, pale at the back. Common foot-stalks round, bent, three or four inches long, swelling at each extremity. Flowers in axillary clusters snow-white. Differs from *R. quinata* in having mostly six leaflets on a stalk, which are acute reticulated with veins at the back and larger than in that species. The flowers moreover grow in clusters, not in umbels.

NOTICE OF RAY.

JOHN RAY, or WRAY, in Latin RAIUS, an English divine, and one of the most learned and most copious of the naturalists of the seventeenth century, was born at Black Notley, near Braintree, in Essex, on the 29th of November, 1628. He was the son of a blacksmith.

His education was begun at the school of Braintree, and continued in Cambridge, first at St. Katherine Hall, and afterwards at Trinity College, in which foundation he obtained a fellowship, at the same time with Isaac Barrow, the celebrated mathematician, and instructor of Newton.

This provision enabling him to follow the bent of his inclinations, Ray devoted himself with equal ardour to science and literature, and made such progress, that at the age of twenty-three he was chosen tutor in Greek, and soon afterwards in mathematics and the humanities.

He was distinguished at the same time by the sermons and other discourses which he delivered in the college chapel, and in which, it may be remarked, he carefully avoided the inflated and bombastic style which at that period disfigured pulpit eloquence in England.

His favourite studies, however, from his earliest years, appears to have been that of the works of Nature, and all his leisure to have been employed in herborizing. He became first known as a botanist in 1660, by the publication of his 'Catalogus Plantarum circa Cantabrigiam

nascentium,' one vol. 8vo, which was the result of researches he had pursued for ten years.

This book is in reality a work of little importance, but it is interesting as marking the commencement of the longest and most useful career which had up to that period been recorded in the annals of botanical science; in the preface to it, which, like those of all his works, deserves perusal, he enumerates the difficulties which he had to overcome in the prosecution of his labours, the principal of which appear to have arisen from the want of a guide whom he might safely follow. His unwearied patience and great sagacity, however, enabled him to surmount all obstacles. The Catalogue is arranged alphabetically, but at the end is subjoined the sketch of a method which he had invented, and which he employed merely for the purpose of enabling him to recognize the plants he met with. This method differs but little from that followed by C. Bauhin, in his 'History of Plants,' which excellent work had just appeared, and was quoted amongst the earliest by Ray, who was also one of the first to refer to the important labours of Jungius, at that time only in manuscript.

The dryness naturally incidental to a work of this nature is in this instance enlivened by the frequent introduction of curious notes, referring not only to plants themselves and their anatomy, but also to other branches of natural history, and especially to entomology, which Ray appears already to have made an object of study. He had also observed the hermaphroditism of the snail. A Supplement to this Catalogue was published in 1663, and a second in 1685.

Ray's talents as a preacher, and his acquirements in classical and theological learning, naturally promising advancement in the church, he was ordained in 1660, immediately after the restoration of Charles II. His hopes, however, in this direction were soon arrested, as he was compelled by conscientious scruples to refuse adhesion to the Act of Uniformity, which was passed in 1662, and which required all clergymen to subscribe to

certain propositions framed for the purpose of excluding Presbyterians. His refusal, however, to subscribe to this test did not arise from his being himself of that persuasion, for he always retained his connexion with the Anglican church, and died in its communion, but that the measure appeared to him repugnant to religious liberty, and opposed to the promises which had been made for its maintenance. His nonconformity, however, obliged him to resign his Cambridge fellowship, and his position would probably have become attended with embarrassment, had he not been assisted by one of his pupils, whose name was destined afterwards to be associated with his own. This was Francis Willughby, a gentleman of good fortune and of an old English family, several branches of which were subsequently raised to the peerage. Willughby was born in 1635, and was thus only seven years younger than his tutor; and their mutual taste for natural history having already united them in the closest bonds of friendship, they determined to devote themselves entirely to their favourite science, and with this view travelled, together with two other young men,* from 1663 to 1666, over various parts of England, France, Germany, and Italy. In this tour they collected immense materials for works of which they had already conceived the plan: Willughby applying himself more particularly to the observation of animals, and Ray to that of plants. A year after their return, or in 1667, Ray was chosen a Fellow of the Royal Society. At that time the celebrated Dr. Wilkins, bishop of Chester, and one of the founders of that great institution, was engaged upon his universal and philosophical language, the nature of which he has explained under the title of 'An Essay towards a Real Character and a Philosophical Language.' He induced Ray to undertake a methodical arrangement of the vegetable kingdom, which, if effected, would have conduced to the completion of his own project; but Ray found himself constrained by

* Philip Skippon and Nathaniel Bacon.

the narrowness of the scheme proposed by Wilkins, and being desirous of giving a freer scope to the ideas he had already conceived with respect to the classification of plants, published a work on this subject, under the title of 'Methodus Plantarum nova;' Lond. 1682, 1 vol. 8vo. In this book, as he acknowledges, he was much assisted by the labours of his predecessors, such as Cæsalpinus and Jungius, which were at that time but little known. He also states that he had availed himself of all that suited his purpose in the writings of Morison, a professor at Oxford; but the fact is, that he simply republished the improved method invented by the latter, starting, as he does, with the dichotomous arrangement, and which he never abandoned. He agrees with Morison also in the division of plants into *ligneous* and *herbaceous*, with the former of which he commences, but he introduces an improvement, in making but two subdivisions of that class, viz. *trees* and *shrubs*, instead of three, as Morison had done, borrowing from Theophrastus; and it is only, as he says, that he might not depart too widely from common usage, that he refrained from not making any division of it at all. In fact, he afterwards became convinced of the propriety of not doing so, but stopped at that conclusion, and obstinately remained there, since he thought that Nature itself had afforded a precise means of distinction between trees and herbs, and that this distinction was indicated by the presence of buds, the existence of which he admitted only in *trees*. He was the first to announce that buds were new annual plants, springing up from the old ones; but he proceeded only half way in his discovery, as he refused to recognize the presence of buds in herbaceous plants. Thus, as it happened, this beautiful observation served only to retard the efforts which Rivinus had just made to relieve botany from the trammels which impeded its progress for half a century longer, or until the time of Linnæus; and this was one of the principal points that afforded ground for discussion between Ray and Rivinus, of which more will be said hereafter. A

real advantage, nevertheless, resulted to botany from these labours: natural families were better defined; a more precise distinction was made between complete and incomplete flowers; and lastly, the great division of plants into "monocotyledons" and "dicotyledons" was established.

The characters of several classes were given with great precision; various technical terms were introduced, which proved very useful as regards accuracy of language; and lastly, Ray propounded several principles and general laws respecting methods, which have since been very generally adopted. In 1703 a new edition of this 'Methodus' was published, with important additions.

Whilst the thoughts of Ray were thus directed to methods in general, he did not neglect the study of species, and especially of those of his own country. His 'Catalogue of the Plants of England,' published first in 1677, and arranged in alphabetical order, has been the basis of the Floras of that country.

The edition of 1690, entitled a 'Synopsis,' is held in high esteem, and is an excellent work. It is arranged according to his method. In it great sagacity is displayed in the synonomy of the species, and it is also enriched with a great number of plants, for which the author was indebted to several of his botanical friends, such as Dale, Sloane, Petiver, &c. A third and much enlarged edition of this work appeared in 1696. Dillenius edited a fourth, infinitely more complete, in 1724; and Hill arranged another in 1760, on the Linnæan system. Having made known the plants of his own country, Ray undertook the comparison of them with those of other parts of Europe: this task he executed by arranging in a catalogue those species not found in England, which he had collected in his travels. This work appeared in 1673. He afterwards found that it might be made of much more general interest in the different countries to which it referred, if he collected together all the species which had been observed; so that at last it became an entirely new work, which was published in 1694, under the title

of 'Stirpium Europæarum extra Britannias crescentium Sylloge.'

In the first catalogue he placed the contents in alphabetical order; but afterwards, in the republication of the particular lists, he arranged all those species which belonged to each district according to the authors who had observed them. The consequence of this mode of arrangement is a very interesting sketch of the botanical geography of Europe. An exact synonomy, and numerous highly interesting, though short, notes distinguish this book from a mere catalogue.

Its preface is very remarkable, for it is here that Ray first fully recognized the sexuality of plants, and in reply to an objection which had been already offered to this doctrine, viz., that plants, undoubtedly female, produced seeds, although they were kept entirely apart from the male, he adduces the example of hens which lay eggs, though separated from the cock. It may here be remarked, that the writings of Ray generally afford proof that although he was quite alive to every reported discovery in his favorite sciences, yet that his natural prudence induced him to make use of these asserted discoveries with great deliberation; an instance of which we find in the first volume of his 'Historia Plantarum,' in 1686, where, referring to the passage in which Grew really explains the sexuality of plants, in asserting that the stamen, or as he calls it the "attire," was the male part, restricts himself to saying that this appeared to him "probable." From this it would seem, that conviction of this important truth came upon him by degrees, and that he promoted its extension with great caution. It is in this place also that he enters into discussion with Rivinus, which he commences by endeavouring to prove that that writer was wrong in confounding "ligneous" with "herbaceous" plants, seeing that the former alone were "*gemmiparæ:*" and he afterwards reproaches him with separating plants which have evident affinities, solely because they differ in the number of petals; such as the *Tormentilla*, which has

four petals from the *Cinqfoil*, which has five. He makes the same observation with respect to fruits, which are employed to distinguish, by the number of their loculaments, the secondary divisions in the system of Rivinus; but it is with the greatest respect for his adversary that he expresses his opinion: "Rivini equidem opus vehementer laudo," is the expression he uses. Rivinus replied in the same tone, and in the letter which he addressed to Ray on this subject, he acknowledged him to be the most skilful botanist that had ever existed: "Et botanicorum quotquot fuerunt facilè principem noveram." He commences his reply by defending himself against the charge of confounding the two classes of plants, and he not unfrequently strengthens his arguments by the words of Ray himself; and as regards the separation of plants, founded solely on the number of their petals, or of the loculaments of their fruits, he answers, as Linnæus afterwards did, and whose precursor he was, that his object was simply to afford a method by which plants might be easily known. This letter of Rivinus was printed at Leipsic in 1694. Ray's reply to it appeared under the title of 'Joannis Raii Responsoria,' in 1696. It preserves the same respectful tone as the former, and contains a great many interesting observations; but, although Ray is occasionally right in the details, yet, in spite of the subtlety of his reasoning, he is unable to destroy the solidity of his adversary's principles. In a postscript he refers to the 'Elements of Botany' of Tournefort, which had then just appeared, and he does so for the purpose of defending himself; for he says, that "beginning to turn over the pages carelessly he frequently saw himself quoted, and always to be blamed," and this chiefly because he had added to his generic characters particulars which were not necessary;* and to which he replies by asserting, that

* The fact is that Tournefort, having endeavoured to show that the generic characters should be taken from the parts of fructification only, says, whenever the opportunity offers, and after giving his own characters, "*Thus Mr. Ray is wrong in adding such a particular.*" For example, under the genus Mandragora, he says, "*that it is not essential to this genus that its*

the characters he gave would serve to render recognition of the plant more easy; and proceeds to recriminate, by showing that Tournefort had frequently employed similar characters in his genera of the second order. To this Tournefort gave the best possible reply, by omitting in his 'Institutiones' expressions which were not only offensive to the person to whom they referred, but were also annoying to the reader, and by professing on all occasions the highest esteem for Ray; by whom all these discussions were collected in his 'Dissertatio nova de variis Plantarum Methodis,' (1696,) in which he attacks Tournefort's method at greater length; but to this attack he himself gave an involuntary reply in the edition of his 'Methodus Plantarum emendata et aucta,' which appeared in 1703, in which, instead of simply giving his former method corrected, he furnishes an entirely new one; for at this time, according to the expression of Linnæus, "E fructistâ corollista evasit," which means, that he imitated the example of Tournefort and Rivinus, in taking the corolla for the basis of his method, following the one with regard to its form, and the other with respect to the number of its parts; besides this, he made many corrections in his generic characters, yet in spite of these alterations there can be no doubt that he retained fewer natural families than Tournefort had done. After all, however, these illustrious rivals came out of their contention with honour and mutual respect; and without deeming one superior to the other, we may profit by the light the labours of both shed upon botanical science.

To the observations of all kinds made during his great tour, and published in 1673, Ray subjoined catalogues of the species he had observed, or which were communicated to him; and in the same year he inserted, in a Collection of Travels of Rauwolf and some other naturalists, republished under the title of, 'Collection of curious Travels and Voyages,' (London, 1705, 8vo) three cata-

flowers should arise immediately from the root, and that the root should be large, as Ray describes it; for a species might be found with a tall stem and a slender root."

logues of plants of the Levant. But his principal work on the vegetable kingdom is the 'Historia Generalis Plantarum,' in three vols. folio; the first of which appeared in 1686; the second in 1688; and the third, which is a supplement, not till 1704. In this work he has collected in order, and described methodically and clearly, all the plants made known by his predecessors, and added those which had been discovered in his own time.* Haller, Sprengel, and others, who have spoken of this work, agree in looking upon it as the fruit of immense labour, and as displaying great learning, combined with critical acumen and sagacity; although, having been composed for the greater part from facts taken from other writers, it cannot be considered as an original source in the science Ray also paid considerable attention to vegetable physiology, and in the 68th volume of the 'Philosophical Transactions' is an interesting memoir from his pen, on the ascent of the sap in trees; and he has related, in various parts of his writings, many instructive observations in this department of physical science. In the first book of his 'Historia Plantarum,' under the simple title of "De plantis in genere," he has displayed the rare talent requisite to bring these scattered observations into one point of view, and here may be found the principal discoveries on the nature of plants, made by Cæsalpinus, Columna, Grew, Malpighi, and Jungius, in addition to those made by Ray himself; and in this way resulted the most complete treatise which had as yet appeared on vegetation in general; and it must be remarked that, although this work may not have been very frequently quoted, yet it is through it that the doctrines of these authors were made common, and became,

* According to Adanson, there are mentioned in this immense work, 18,625 plants, arranged in thirty-three classes, of which six, or nearly one-fifth, are natural ones; and 125 sections, of which forty-three, or one-third, are also natural. The idea of the work is very good, and it would have been more successful, had the author been as great a botanist as he was a learned writer and judicious compiler. [The previous remarks of the authors are sufficient proof of the greatness of Ray as a botanist.]

as it were, popular in the science; and on this account, we believe, that the best monument that could be erected to the memory of Ray would be the republication of this part of his work separately.

These numerous writings formed an epoch in the history of botany, and placed their author in the first rank among contributors to the progress of the natural history of the vegetable kingdom. The works, however, of later naturalists, and especially those of Linnæus, on account of their more precise terminology and more convenient nomenclature, have superseded those of Ray, which are now scarcely resorted to, except by those who interest themselves specially in the history of the science.

The works which he composed or published in zoology are yet more important, and have been much more fortunate, for they still retain their utility. It may be said, that they are the basis of all modern zoology; and naturalists are continually obliged to consult them, to explain the diffiulties which occur in the writings of Linnæus and his copyists.

Ray, however, was only induced to apply himself to zoology by a feeling of gratitude towards his friend Willughby, who, on his death, in 1672, at the age of 37, entrusted to Ray both the education of his two children, whom he left of a tender age, and the task of arranging the materials which he had collected in zoology for the works which, from the period of their first acquaintance, Ray and he had projected in common. Ray devoted himself with ardour to this double duty, and composed his 'Nomenclator Classicus' for the use of his pupils, of whom the elder died young, and the second was afterwards raised to the peerage, under the title of Lord Middleton.

He displayed also as much zeal as fidelity in the editing and publication of the two great works which Willughby had undertaken, and which Ray might, not unjustly, perhaps, have regarded in great measure as his own, since they had been originally designed with the same object

as his 'History of Plants,' and were arranged by him in a similar manner; and it is easy to perceive that they are from the same hand and written in the same style; their materials, however, had been collected by Willughby, who undertook the department of zoology, on the original partition of his and Ray's common task.

Although these materials were still in disorder, and incomplete when Ray received them, yet he considered it as a strict obligation to raise from them a monument to the memory of his friend, and with this view he published them entirely under his name.

The first of these works, or the 'Ornithologia,' appeared in 1676, in one vol. folio; and the second, which required still more labour, and which is more complete of its kind, the 'Historia Piscium,' in 1686, in two vols. also folio. Besides all the species of Belon, Rondeletius, Gesner, Aldrovandus, Olina, and Margraaf, there are a great many in these two histories which were observed by Willughby and Ray in Germany and Italy.

The fishes of the Mediterranean especially are there described with remarkable precision; and it is frequently more easy to find them in Willughby than in Linnæus. These works also contain numerous figures, the great part of which indeed are only copies, but among them are several original and very good. Those even which are taken from Belon and Rondeletius acquire interest on account of the descriptions with which they are accompanied, and which are much superior to those of the original authors.

Ray has left under his own name some less extensive works on zoology, but which have had no less influence on the progress of the science. These are,

1st, 'Synopsis Methodica animalium Quadrupedum et Serpentini generis,' in 8vo, London, 1693; in which are united, under the common title of quadrupeds, both the mammiferous and the oviparous classes.

2d, 'Synopsis Methodica Avium;' and

3d, 'Synopsis Methodica Piscium.' 1713.

The two latter are posthumous, and were published by Derham, who performed towards Ray the same office that the latter had so well fulfilled towards his friend Willughby; they form an abridgment of the 'Ornithology' and 'Ichthyology' which had appeared under Willughby's name, with important additions, due principally to the collections made by Sloane in Jamaica, and which had been placed at Ray's disposal by that learned physician.

The "cetacea" are there arranged among fishes, and described according to the Phalænography of Sibbald, which had just appeared; but on this point Ray wrote expressly to Rivinus to explain that he classed them thus only in accordance with common usage.

4. 'Historia Insectorum,' 1710, in 4to, also posthumous, and printed at the expense of the Royal Society, and under the inspection of Derham. To this book Martin Lister added a treatise on the "spiders" and "scarabi" of England, and it is remarkable for the innumerable descriptions of insects which it contains, a great part of which also was due to the labours of Willughby. The author rejects the doctrine of spontaneous generation.

The distinctive character of Ray's works consists in the clearness of his methods, which were not only more rigorous than those of any of his predecessors, but applied with greater uniformity and precision. The divisions which he introduced into the classes of quadrupeds and birds have been followed by English naturalists even to the present day; and we find evident traces of Ray's arrangement of birds in Linnæus, Brisson, Buffon, and all authors who have written upon this class of animals. The 'Ornithology' of Salerne is but a translation of the 'Synopsis;' and Buffon is indebted to Willughby for almost the whole of the anatomical portion of his 'History of Birds.' A translation also of his articles on fish has afforded nearly the whole of the substance of the 'Dictionnaire d'Ichthyologie,' by Daubenton and Haüy, in the 'Encyclopédie Méthodique.' These labours, however, in nearly all branches of natural history, vast as they appear to the imagination, did not

distract Ray from his earlier theological studies. In his treatise entitled 'The Wisdom of God manifested in the Works of the Creation,' he has well shown how these studies could be combined. He had conceived the design of this work in his youth, and laid its foundation in his lectures at Cambridge, but it was not fully developed, nor published till 1691, in 1 vol. 8vo. It is an exposition of the admirable care with which Providence has disposed all beings for the functions they have to perform in the great scheme of the universe, and has furnished each in suitable degree with all that may be required for its preservation and support.

The study of nature is represented as a pious duty, and the author endeavours to show the probability that such studies will become part of the occupations of another life.

The lectures and sermons, formerly delivered at Cambridge, also afforded the groundwork of his 'Three Physico-Theological Discourses,' published in 1692, and the subjects of which were 'Chaos,' the 'Deluge,' and the 'End of the World.' These discourses present a system of geology quite as plausible as any which had previously appeared, or was produced for a long time afterwards.

These two works have long been held in much esteem in England, and have passed through many editions. The former has also been translated into several languages. It was printed in French, at Utrecht, in 1714, in 8vo, and the twelfth English edition appeared in London in 1759.

Ray also made a collection of English Proverbs, which was one of his earliest works, and perhaps the most generally popular of all in his own country. It was composed in 1669, but was not published till 1672 or 1673. He also made a collection of English words in little use, or peculiar to certain districts.

All his works on natural history are in Latin; they are composed in an unaffected style, and are less cumbered than those of his successors with a multitude of new terms, so burdensome to the memory. Wilkins requested him to translate into Latin his 'Real Character,'

and it is believed that the manuscript of this translation is still extant among the papers of the Royal Society.

Although of weak constitution, Ray reached the age of 77, but in his later years suffered much, being afflicted with painful ulcers, which deprived him of the use of his legs. He died on the 17th January, 1705, at Black Notley, to which place he had retired for many years. He was married in 1673, being then 45, and his wife 20. From this marriage he had four daughters, three of whom survived him. His manners were mild and affable, and in his life, as in his works, he was an example of piety and charity.

Bishop Compton erected a monument to his memory in the churchyard of Black Notley, which has since been removed into the church, and on which is a long and elegant Latin epitaph, composed by William Coyte.*

Some days before his death Ray presented all his collections in natural history to Samuel Dale, an apothecary, of Norwich, and who was himself known by some productions in that science.

It is to be regretted that Ray made no herbarium; but those belonging to some of his contemporaries, and now deposited in the British Museum, afford every facility for the determining of the plants which he has described.

Plumier dedicated to him his genus Janraja, the name of which was afterwards transposed by Linnæus into that of Rajania, as being more conformable to his principles. This genus was at first placed in the family of the *Asparagineæ*, but, together with several others, has been detached from that group, and it now forms one of the *Smilacineæ*.

Various species of fish also bear the name of Ray, as having been discovered by him. A life of Ray, written by Derham, and what remained of interest among his papers, were printed by George Scott, in 1760; and a more detailed account of his life, by Sir J. E. Smith, President of the Linnæan Society, was inserted in Rees's Cyclopædia.

* See page 84.

A

CATALOGUE OF THE PUBLISHED WORKS

OF

JOHN RAY, M.A. F.R.S.

(ARRANGED CHRONOLOGICALLY.)

A CATALOGUE

OF THE

PUBLISHED WORKS OF JOHN RAY,

ARRANGED CHRONOLOGICALLY.

1660.

Catalogus Plantarum circa Cantabrigiam nascentium: in quo exhibetur quotquot hactenus inventæ sunt, quæ vel sponte proveniunt, vel in agris seruntur; unâ cum synonymis selectioribus, locis natalibus et observationibus quibusdam oppio raris. Adjiciuntur in gratiam tyronum, index Anglo-Latinus, index locorum, etymologia nominum, et explicatio quorundam terminorum.— Cantab. 1660, pp. 103, 12mo.

1663.

Appendix ad Catalogum Plantarum circa Cantabrigiam nascentium continens addenda et emendanda.—Cantab. 1663, pp. 13, 12mo.

1668.

Tables concerning Plants in Dr. Wilkins's 'Real and Universal Character.'— 1668, pp. 53, fol.

1669.

Experiments concerning the motion of Sap in Trees, made by Mr. Willughby and Mr. Wray.—'Philosophical Transactions,' Vol. 4, No. 48, p. 963.

1670.

A Collection of English Proverbs, with short Annotations, 8vo.—Cambridge. The original edition was published in 1670, anonymously.

Catalogus Plantarum Angliæ et insularum adjacentium: tum indigenas, tum in agris passim cultas complectens. In quo præter synonyma necessaria facultates quoque summatim traduntur, una cum observationibus et experimentis novis medicis et physicis.—Lond. 1670, pp. 358, 12mo.

1671.

An Extract from a Letter concerning Spontaneous Generation, and also of some Insects smelling of Musk.—'Philos. Trans.,' Vol. 6, No. 74, p. 2219.

An Account of the Dissection of a Porpoise, by the learned Mr. John Ray, having therein observed some things omitted by Rondeletius.—'Philos Trans.' Vol. 6, No. 76, p. 2274.

1673.

Observations, topographical, moral, and physiological, made on a Journey through part of the Low-countries, Germany, Italy, and France, with a Catalogue of Plants not native of England, found spontaneously growing in those parts, and their virtues. Also is added, a brief Account of Francis Willughby, Esq., his Voyage through a great part of Spain.—Lond. 1673, (Travels) pp. 499, 8vo. The Catalogue has the following title: 'Catalogus stirpium in Externis regionibus a nobis observatarum, quæ vel non omnino vel parce admodum in Anglia sponte provesuiunt.'—pp. 115.

1674.

A Collection of English Words not generally used, with their significations and original, in two alphabetical catalogues, the one of such as are proper to the northern, the other to the southern counties; with Catalogues of English Birds and Fishes, and an account of the preparing and refining such metals and minerals as are gotten in England.—Lond. 1674, pp. 178, 12mo.

1675.

Dictionariolum trilingue secundum locos communes, nominibus usitatioribus Anglicis, Latinis, Græcis, ordine παραλλήλως dispositis.—London, 8vo, 1675, pp. 91. Several editions of this work were subsequently published with the title 'Nomenclator Classicus.'—A fifth edition, 1706, pp. 84.

Some Considerations about the Air Bladders of Fishes.—'Philos. Trans.,' Vol. 10, No. 115, p. 349.

1676.

Francisci Willughbeii de Middleton in Agro Warwicensis, Armigeri, e regia Societate, Ornithologia libri tres in quibus aves omnes hactenus cognitæ in methodum naturis suis convenientem reductæ acuratè describuntur, descriptiones iconibus elegantissimis et vivarum avium simillimis, æri incisis illustrantur. Totum opus recognavit, digressit, supplevit Joannes Raius. Sumptus in chalegraphos fecit illustriss. D. Emma Willughby Vidua.—Lond. 1676, pp. 312, fol.

1677.

Catalogus Plantarum Angliæ, &c.—Editio secunda, plantis circiter quadraginta sex et observationibus aliquam multis auctior.—Lond. 1677, pp. 327, 12mo.

1678.

The Ornithology of Francis Willughby of Middleton, in the county of Warwick, Esq., Fellow of the Royal Society. In three books. Wherein all the Birds hitherto known being reduced into a method suitable to their natures are accurately described. The descriptions illustrated by most elegant figures, nearly resembling the live birds, engraved in LXXVIII copper-plates. Translated into English, and enlarged with many additions throughout the whole work. To which are added three considerable discourses: I. On the Art of Fowling, with a description of several Nets in two large copper-plates. II. Of the ordering of Singing Birds. III. Of Falconry.—Lond. 1678, pp. 448, fol.

1682.

Methodus Plantarum nova brevitatis et perspicuitatis causa synoptice in tabulis exhibita; cum notis generum tum summorum tum subalternorum characteristicis, observationibus nonnullis de seminibus plantarum et indice copioso.—Lond. 1682, pp. 200, 12mo.

1685.

Appendix ad Catalogum Plantarum circa Cantabrigiam nascentium: continens addenda et emendanda. Editio secunda, aucta plantis sexaginta. —Camb. 1685, pp. 30, 12mo.

On the Macreuse. [or "Soter, *Anas nigra* Linn."—*Dr. Derham.*]—'Philos. Trans.;' Vol. 4, No. 172, p. 1041.

Francisci Willughbeii Armig. de Historia Piscium libri quatuor, Jussu et sumptibus Societatis Regiæ Londinensis editi. In quibus non tantum de piscibus in genere agitur, sed et species omnes, tum abaliis traditæ, tum novæ et nondum editæ bene multæ, naturæ ductum servante methodo dispositæ, accurate describuntur. Earum effigies, quotquot haberi potuere, vel ad vivum delineatæ, vel ad optima exemplaria impressa, artifici manu elegantissime in æs incisæ, ad descriptiones illustrandas exhibentur. Cum appendice historias et observationes in supplementum operis collatas complectente. Totum opus recognavit, coaptavit, supplevit, libri etiam primum et secundum integres adjecit Johannes Raius e Societate Regia.—Oxonii. 1686, pp. 343. App. pp. 30, fol.

Historia Plantarum species hactenus editas aliusque insuper multas noviter inventas et descriptas complectens. In qua agitur primo de plantis in genere, earumque partibus, accidentibus et differentiis; deinde genera omnia tum summa tum subalterna ad species usque infimas notis suis

certis et characteristicis definita, methodo naturale vestigiis insistente disponuntur; species singulæ accurate describuntur, obscura illustrantur, omissa supplentur, superflua resecantur, synonyma necessaria adjiciuntur; vires denique et usus recepti compendio traduntur.—Vol. 1, Lond. 1786, pp. 983, fol.

1688.

Joanniis Raii Historiæ Plantarum tomus secundus cum duplici indice generali altero nominum et synonymorum præcipuorum; altero affectuum et remediorum: accessit nomenclator botanicus Anglo-Latinus.—Lond. 1688, pp. 1979, fol.

Fasciculus Stirpium Britannicarum, post editum plantarum Angliæ catalogum observatarum a Joanne Raio et ab amicis cum synonymis et locis natalibus. —Lond. 1688, pp. 27, 12mo.

1690.

Synopsis Methodica Stirpium Britannicarum, in qua tum notæ generum characteristicæ traduntur, tum species singulæ breviter describuntur: ducentæ quinquaginta plus minus novæ species partim suis locis inseruntur, partim in Appendice seorsum exhibentur. Cum indice et virium epitome. —Lond. 1690, pp. 318, 8vo.

1691.

The Wisdom of God Manifested in the Works of the Creation. In two parts, viz.: the heavenly bodies, elements, meteors, fossils, vegetables, animals (beasts, birds, fishes and insects,) more particularly in the body of the earth, its figure, motion, and consistency, and in the admirable structure of the bodies of man and other animals, as also in their generation, &c.; with answers to some objections.—Lond. (1691, 1st edition,) 1701 (3rd edit.,) pp. 464, 8vo.

A Collection of English Words, &c. The second edition augmented with many hundreds of words, observations, letters, &c.—Lond. 1691, pp. 211, 12mo.

1692.

Note on a Letter by Sir Richard Bulkley, concerning the Planting of Maize.—'Philos. Trans.,' vol. 18. No. 205, p. 930.

Miscellaneous Discourses concerning the Dissolution and Changes of the World. Wherein the primitive chaos and creation, the general deluge, fountains, formed stones, sea shells found in the earth, subterraneous trees, mountains, earthquakes, volcanos, the universal conflagration and future state, are largely discussed and examined.—Lond. 1692, pp. 259, 8vo.

This work went through several editions. The title of the third edition, published in 1713, is 'Three Physico-Theological Discourses, concerning—I. The Primitive Chaos and Creation of the World. II. The General Deluge, its causes and effects. III. The Dissolution of the World and future Conflagration." Illustrated with copperplates, and much more enlarged than the former editions.

1693.

Synopsis Methodica Animalium, Quadrupedum, et Serpentini generis. Vulgarium notas characteristicas, variorum descriptiones integras exhibens: cum historiis et observationibus anatomicis perquam curiosis. Præmittentibus nonnulla de animalium in genere, sensu, generatione, divisione, &c.—Lond. 1693, pp. 344.

A Collection of Curious Travels and Voyages. In two tomes. The first containing Dr. Leonard Rauwolff's itinerary into the eastern countries of Syria, Palestine and the Holy Land, Armenia, Mesopotamia, Assyria, Chaldea, &c. Translated from the High Dutch by Nicholas Staphorst. The second taking in many parts of Greece, Asia Minor, Egypt, Arabia Felix and Petræa, Ethiopia, the Red Sea, &c., from the observations of Mons. Belon, Mr. Vernon, Dr. Spon, Dr. Smith, Dr. Huntingdon, Mr. Greaves, Alpinus, Vestingius, Thevenot's collections, and others. To which are added, three Catalogues of such Trees, Shrubs and Herbs, as grow in the Levant; by John Ray.—Lond. 1693, pp. 396 and 186. Catalogue, pp. 45, 8vo.

1694.

Stirpium Europeanarum extra Britannias nascentium Sylloge quas partim observavit ipse, partim è Car. Clusii Historia, C. Bauhinii Prod. et Cat. Bas. F. Columnæ Ecphrasi, Catalogis Hollandicar. A. Commelini, Altorfinarum M. Hofmanni, Sicularum P. Bocconi, Monspeliensium P. Magnoli collegit Joannes Raius. Adjiciuntur Catalogi rariorum Alpinarum et Pyrenaicarum, Baldensium, Hispanicarum Grisleii, Græcarum et Orientalium, Creticarum, Ægyptiacarum, aliique: ab eodem.—Lond. 1694, pp. 400, 8vo. At the end Stirpium Orientalium rariorum Catalogi tres., pp. 45.

1695.

The Catalogues of Plants for each County, published in Edw. Gibson's edition of 'Camden's Britannia.'—1695, fol.

1696.

Joannis Raii Synopsis Methodica Stirpium Britannicarum, tum indigenis, tum in agris cultis, locis suis dispositis, additis generum characteristicis, specierum descriptionibus, et irrium epitome. Editio secunda: in qua præter multas stirpes et observationes curiosas sparsim insertas; muscorum

historia negligenter hactenus et perfunctorie tradita plurimum illustratur et augetur, additis et descriptis centum circiter speciebus (totidemque Fucorum atque etiam Fungorum) novis et indictis. Accessit Clariss. Viri D. Aug. Rivini Epistola at Joan. Raium de Methodo cum ejusdem responsoria, in qua D. Tournefort Elementa Botanica tanguntur.—Lond. 1696, pp. 368. Epistola, pp. 56, 8vo.

Joannis Raii de variis Plantarum Methodis dissertatio brevis. In qua agitur. I. De methodi origine et progressu. II. De notis generum characteristicis. III. De methodo sua in specie. IV. De notis quas reprobat et rejiciendas censet D. Tournefort. V. De Methodo Tournefortiana.—Lond. 1696, pp. 48, 12mo.

1697.

Two Observations, the one concerning the effects of a Poisonous Root, the other concerning the virtues of the Leaves of Hemlock.—'Philos. Trans.,' Vol. 19, No. 231, p. 634.

An Account of the Poisonous Qualities of the Hemlock Water Dropwort [*Œnanthe Crocata*, Linn.]—'Philos. Trans.,' Vol. 20, No. 238, p. 84.

1700.

A Persuasive to a Holy Life, from the happiness that attends it both in this world and in the world to come.—Lond. 1700, pp. 119, 8vo.

1703.

Joannis Raii, Societatis Regiæ socii, Methodus Plantarum emendata et aucta, in qua notæ maxime characteristicæ exhibentur, quibus Stirpium genera tum summa, tum infima cognoscuntur et a se mutuo dignoscuntur, non necessariis omissis. Accedit Methodus Graminum, Juncorum et Cyperorum specialis, eodem auctoris.—Lond. 1703, pp. 227. 8vo.

1704.

Joannis Raii Societatis Regiæ Socii Historiæ Plantarum tomus tertius qui est Supplementum duorum præcedentium: species omnes vel omissas, vel post volumina illa evulgata editas, præter innumeras fere novas et indictas ab amicis communicatas complectens: cum synonymis necessariis et usibus in cibo, medicina et mechanicis: edito ad opus consummandum generum indice copioso. Accessit historia Stirpium Ins. Luzonis et reliquærum Phillipinarum a R. P. Geo. Jos. Camello, Moravo—Crunensi, S. J. conscripta. Item D. Jos. Pitton Tournefort, M. D. Parisiensis, et in Horto Reg. botanices Professoris, corollarium Institutionum Rei Herbariæ.—Lond. 1704, pp. 666 and 135, and 255-6, fol.

1705.

Methodus Insectorum seu Insecta in Methodum aliqualem digesta: a Joanne Raio, M.A., e Societate Regia'—Lond. 1705. 8vo, pp. 16.

1710.

Historia Insectorum auctore Joanne Raio, Collegii S. Trinitatis apud Cantabrigiense, et Societatis Regiæ olim Socio. Opus posthumum jussu Regiæ Societatis Londinensis editum. Cui subjungitur Appendix de Scarabæis Britannicis, auctore M. Lister, F.R.S., ex MSS. Musæi Ashmolæani.—Lond. 1710, pp. 400, 4to.

1713.

Joannis Raii Synopsis Methodica Avium et Piscium; opus posthumum, quod vivus recensuit et perfecit ipse insignissimus auctor: in quo multas species, in ipsius Ornithologia et Ichthyologia desideratas, adjecit: Methodumque suam Piscium naturæ majus convenientem reddidit, cum Appendice et indicibus.—Lond. 1713. Synopsis Avium, pp. 218. Synopsis Piscium, pp. 178, 8vo.

1718.

Philosophical Letters between the late learned Mr. Ray and several of his ingenious Correspondents, natives and foreigners. To which are added those of Francis Willughby, Esq. The whole consisting of many curious discoveries and improvements in the history of Quadrupeds, Birds, Fishes, Insects, Plants, Fossiles, Fountains, &c. (containing 68 letters written by J. Ray; his Dying Words to the Rev. Mr. Pyke; note concerning Kermes and Vegetable Excrescences; and note concerning Boiling Springs.) Published by Dr. Derham.—Lond. 1718, pp. 386.

1740.

Select Remains of the learned John Ray, M.A. and F.R.S., with his Life, by the late William Derham, D.D. (containing four Prayers by J. Ray; his Itineraries; three of his Letters; and his Instructions to his Pupils. Also a sketch of his Life, by Dr. Derham.)—Published by George Scott, M.A.—Lond. 1740, pp. 336.

MR. RAY'S ITINERARIES.

ADVERTISEMENT.

As, from the foregoing Life of Mr. Ray, the public might expect more of his 'Itineraries' than what are here published, the editor begs leave to observe, that those which are omitted are nothing more than some short hints by way of diary; the author's principal observations being, with no small difficulty, transcribed from his notes, and introduced (as the reader will find) in the course of this work.

MR. RAY'S ITINERARIES.*

ITINERARY I.

AUGUST the 9th, 1658, I began my journey from Cambridge, and rode that night to Northampton, thirty-one miles. At Higham Ferrers I took notice of a great antient stone building, which they call the college. Northampton is an old town, but indifferently handsome, the houses all built of timber, notwithstanding the plenty of stone dug in that country. It hath a very spacious market-place, and old castle demolished, and an indifferent good wall. There, in Mr. Brooker's garden, I saw divers physical plants, and took especial notice of *lupinus luteus odoratus* [probably *L. luteus* Linn.] which was very luxuriant there; the soil where it grew was sandy, and the place warm. Great plenty of cabbage, and roots, and onions, and the like, are planted near this town.

August the 10th, I travelled from Northampton to Warwick, by the way passing through Daventry, eight miles distant; and in sight of Holdenby House, which was a very stately pile of building, and a pleasant situation; and then by Shuckborough, where lives an ancient family of that name. Hereabout are found star-stones,

* The following 'Itineraries' were published in 1760 by Mr. Scott, and are selections made from Ray's original journals. It is manifest that they were not intended for publication, being only Ray's private notes of such things as seemed most interesting to him. In the present reprint no alteration has been made; even the erroneous spelling of the names of places being retained as in the original. The editor has added between brackets [], the modern names of the plants and animals mentioned, and occasionally appended a foot-note.

but I was not then advised of it. This place may be seen at the least twenty miles, I think, every way, standing on a high hill, in the midst of a level. At Warwick I staid several days, and lodged at Sir Henry Newton's at the Priory; and, in the mean time, went to St. Mary's, the principal church, from the steeple whereof I had a prospect of the town, which, for the bigness of it, is good and neat, well built, and pleasantly situate, the body of it in form of a cross, as most old towns are. In the church is a very handsome choir, wherein they receive the communion; a large chapel, in which is a goodly brass monument of one of the Beauchamps, who served King Henry VI in the French wars; also the monument of the famous Robert Dudley, Earl of Leicester; and in a little round place like a chapter-house, a marble monument of Sir Fulke Grevile's,* inscribed, "Fulke Grevile, servant to Queen Elizabeth, counsellor to King James, and friend to Sir Philip Sidney." I went then to see the castle belonging to my Lord Brooke, who then lived in it, and was in a consumption, and is since dead. There are two noted towers, one called Julius Cæsar's tower, and another which stands higher, called Guy's tower, which we ascended, and from thence had a prospect of the country round about, where we noted Kineton and Killingworth castle, now almost quite demolished. I neglected to see the rib of the dun cow, and Guy's sword. I rode out a mile or more from the town to see Guy's cliff, a house so called, on the bank of the river Avon, where then my Lord Baltinglass did live; there I saw a little chapel or chauntry, wherein was Guy's statue, in the just dimension, and a small grot in the rock, which they call Guy's cave, in which he is reported to have shut himself up and done penance. Here are butteries and cellars cut out of the living rock. During my abode at

* Sir Fulke Grevile, Lord Brooke. Mr. Walpole, in his ingenious account of the royal and noble authors of England, and their works, has given a character of this noble peer, and has made good use of the particularity in his epitaph.—G. S.

the Priory, I visited Sir Simon Archer, who lived then in Warwick; at whose house I saw many rarities, especially many pieces of turned work in ivory, incredibly small and curious; also a letter patent of King William I; a letter of the Pope with a leaden seal, to grant liberty to one Archer to build a chapel; a plenary indulgence to another of that name by Pope Boniface IX. On one side of the seal, written in capital letters, "Bonifacius VIIII," on the other side were two faces looking one towards another, and above, these letters "S.P.A. S.P.E." i. e. "St. Paulus, St. Petrus." The like seal and inscription on the forementioned grant. Also a patent of Edward III for free warren to another of the name of Archer, with a seal; on the one side of which was the figure of the king on horseback; on the other, he was represented sitting on his throne.

August the 18th, I departed from the Priory, and rode through Coventry to Ashby-de-la-Zouch. Coventry is a well-built city, and has a very beautiful market-cross, and one large church. The story of the Lady Godeva, who rode naked through this town, may be had at large, in Dugdale's 'Description of Warwickshire," and indeed whatever is remarkable, or worth noting in the whole county. At Ashby I saw the Earl of Huntingdon's house, now almost quite ruined; this was the principal strength of the garrison at Ashby. Thence, the next day, I passed on through Derby to Ashburn in the Peak. Derby is a large town, but meanly built; there have been in it five churches, but some of them are decayed, and ready to drop down. Here I was told by a countryman, that there is a pool on the top of a mountain, reported bottomless, near Leek, named Blackmeer. In my journey this day I saw some coal-pits about two miles from Ashby, and passed the river Trent at Swarson bridge, where is a caussey cross the meadows about half a mile long, that deserves to be remembered, cast up with abundance of pains and cost at the first.

August the 19th, I got to Ashburn, where is a very fair church, built cathedral-wise.

August the 20th, I lodged at Buxton or Buckstone, and that night entered Pool's Hole, which is about half a mile distant from thence. The bottom of this hole is all very uneven and slippery, and somewhat dangerous to walk in; the water therein dropping from the top, petrifies into a white crumbling stone, somewhat like alabaster, and wherever there is a drop of water distilling constantly from the top, there is under it a pillar of stone, which, by degrees, rises higher and higher, and will at last, doubtless, come to touch the very top. One of these pillars, more large and remarkable than the rest, they call the font, for its likeness; for they have all of them a cavity in the head, containing a good quantity of water, into which the drops fall. The water *entire* petrifies not, but there be in it atoms of stone dissolved and swimming, as do the parts of a metal dissolved in a convenient menstruum; with these, whether the water being overcharged doth precipitate or let go some, or whether by adhesion or similary attraction some of them leave the water, and stick to others till at last they compound a great mass? For as common or rain water falling upon a stone doth continually carry away some insensible *ramenta* or atoms of it, which probably are sustained by the water as by a convenient menstruum, so here the water being more than sated or impregnated with lapideous atoms falling upon a stone doth continually let some go, which, being of the same nature, adhere to the stone and augment its bulk. In the rude rock there be some stones which imitate a bacon flitch, some a lion, &c., which they call by those names. There is in it a place which they call the Queen's pillar, because Mary, Queen of Scots, went in so far; beyond which it is not easy to go without climbing on your hands and knees. Sometimes, in a rainy winter, this cave at the bottom is full of water, which gusheth out in great plenty at the mouth of it. At Buxton I saw and felt the water in the hot-well, which is nothing near so hot as the waters at Bath. Hereabout are very many hot springs, and some cold ones near them, but not

any that I could find so near as is reported, viz., that you might put your thumb into one and your finger into another. I think thereabout be as many, and possibly some as hot springs as any at the Bath. Underneath the earth is nothing but limestone. Here is a well called St. Anne's of Buckstone, a warm spring which they drink, and fancy that it cures all diseases. On the moorish hills and in the pastures hereabout, I first observed *Alchimilla* [*A. vulgaris*, Linn.,] *Muscus clavatus sive lycopodium* [*L. clavatum*, Linn.,] *Erica baccifera fructu nigro* [*Empetrum nigrum*, Linn.,] *Viccinia rubra* [*Vaccinium Vitis-idæa* Linn.,] *Vitis idæa thymi foliis, muscus erectus abietiformis* [*Lycopodium Selago*, Linn.] Out of an hill near Buxton, called Axe-edge, spring four rivers, which run four contrary ways, viz., Dove south, Dane west, Gwayt north, and Wye east.

August the 22d, I rode to a place called Weeding Well, where there is shown a little well, which, they will tell you, sometimes ebbs and flows three times in an hour, but in these dry summers hath quite ceased. Thence I went to Elden-hole, which may be, for aught I know, for depth, such as is reported: if you cast a stone into it, after a while you shall hear the noise of it striking against the sides to and again. They tell a story of Sir Thomas Cavendish endeavouring to fathom it, and of a stone that sticks out in it on one side about fourscore fathoms down; it lies open without any fence or rail, so that it is easy for cattle to fall into it. Hence I went to Mamme Torr, which is a high mountain broken on one side, of which the tradition is, that the earth continually falls down, yet is not the hill anything diminished, nor the heaps of earth below at all increased. I got as near as I could to the broken side, but could not hear or see any such running down of the earth; when there is rain, the water running down washeth away with it much of the hill. I was informed, that on the top of this mountain is an antient Roman camp, encompassed with a double trench, whereabouts are sometimes found store of antient

Roman medals. Hence I went the same day to Castleton, when I entered that great and famous *specus* or cave called the Devil's A——, which is of a marvelous breadth at the mouth, and wider, they say, than any artificial arch now to be seen; within the entrance are two or three cottages where poor people live. I went in as far as the first water, which is not far, which, if you pass, they say you meet with a second, which likewise may be passed, and then you come to a third, where the water and the top meet. Upon the mountain, just above this hole, stands an old castle, from whence the adjoining town took its name. Hereabout grows plenty of *Cochlearia rotundi folia* [*Cochlearia officinalis* and *C. grœnlandica*, Sm., *C. officinalis* β *alpina*, Bab.,]* as I was informed by several people living here, of which I doubt not, because I have found it in the little rills descending from many high hills, as Penigent and Ingleborough.†

* Ray confounds this plant (Syn.) with the *Cochlearia* (J. B.,) the true *C. officinalis* of modern botanists; but Dillenius, in his edition of the 'Synopsis,' separates it from that species by the name of *C. rotundifolia*, Merret. There seems no reason to doubt its being the plant usually intended by *C. grœnlandica*, although the Linnæan species of that name has been shown by Nolte (Nov. Fl. Holsat. 57-62) to be formed out of small forms of *C. officinalis* and *C. danica*.—C. C. B.

† On this hill, says Mr. Ray, grows the following plants; to wit, *Polygonatum latifolium* [*Convallaria Polygonatum*, Linn.]; *Sedum Ericæ foliis*, [This is probably the *S. alpinum ericoides cæruleum*, Ray; *Saxifraga oppositifolia*, Linn., which is found near to the summit of Ingleborough], (about the Beacon plentifully); *Thalictrum minus*, [*T. minus*, Linn.]; *Lilium convallium*, [*Convallaria majalis*, Linn. This station seems to have escaped the notice of modern botanists.] *Allium ursinum*, [*A. ursinum*, Linn.]; also a small yellow mountain *Sedum*. [The only plant in Ray's 'Synopsis' to which this can refer is the *S. minus Alpinum luteum nostras*, which is the *Saxifraga aizoides*, Linn.], and a sort of *Myagrum* [?], *Rhodia radix*, [*Rhodiola rosea*, Linn.; *Sedum Rhodiola*, De Cand.]; *Sedum ericoides;* [This appears to be the same as the *S. Ericæ foliis* already noticed. The repetition of this and the following is probably due to Dr. Derham]; and *Sedum Alpinum luteum minus*, [*S. aizoides*, Linn.]; all three abundantly; also *Salix pumila folio rotundo Alpina*, but in no great plenty. [The last name is usually considered as synonymous with *S. reticulata*, Linn.; but as no botanist since the time of Ray is known to have found that plant in England or Wales, and as *S. herbacea*, Linn., the *S. alpina Alni rotundo folio repens* of Dillenius, in the 3d edition of Ray's 'Synopsis,' is found plentifully in the stations given by Ray for his *S. pumila*, &c. We are led to suppose that he may have misapplied to *S. herbacea* the name intended by its author

Hence, climbing many stony hills, and passing many unevennesses, I proceeded as far as Dickly, in the way to Manchester, which is a large and a very neat town. Here I took notice of the college and the new library, which they had furnished with useful and choice books. I saw the free-school and the church, from the steeple of which I had a prospect of the town. Accompanied with Mr. Birch, the school-master, I went to see the place, where of old had been, I think, a Roman fortification, which they there call the castle; it is a mile or more from the town; the area thereof is large. Near this spot I saw a little house cut out of the rock, the like whereto I had before seen at Guy's Cliff, and since at Bridgenorth, Nottingham, and other places.

August the 24th, I directed my course towards North Wales, and that night lay at West Chester. I passed through Northwych, where I saw the manner of making salt. The brine pit or salt spring is near to the bank of the river, thence they pump up the water, which is by troughs conveyed into the pans, where it is evaporated by boiling. The salt, after its crystallizing, falls down to the bottom, and they take it out by wooden scummers and put it in frails, and set it in a warm room behind the furnace to drain and dry. The salt is very white; I did not inquire whether they made use of ox's blood, as they do who make salt of sea water. The city of Chester is large and indifferently fair. It hath one peculiarity which no other town hath, that I have seen in England; that is, the rows, as they call them, or cloisters on each side of all the considerable streets in the town, in which one may walk the streets under cover in the dry, in the most rainy and wet weather. The town is well walled about; the cathedral built of a red sandy stone, which suffers much by the weather; it hath little beauty within or

(J. Bauhin) to belong to *S. reticulata*, and that thus Dillenius has been misled into giving the former plant under two names in his edition of the 'Synopsis.' Should this view be correct, *S. reticulata* must be considered as inhabiting the Scottish mountains alone in Britain.—C. C. B.]

without. There is likewise a castle held by a small garrison, wherein the assizes are kept.

August the 25th, from Chester I rode over the sands as far as Flint Castle, which stands upon the sea, but is now almost quite fallen down; thence to Haliwell, where I saw and drank of the so much famed water of St. Winifred's well, which I knew not how to distinguish from common water. It is a most copious spring; I have not anywhere seen so much water rise out of the earth in so small a compass. Over it is a handsome stone building, and by it a chapel, where lie continually a great number of poor, lame, impotent people, more I believe to beg and receive the alms of strangers, that either out of curiosity or devotion come to visit and see the well, than out of hope to receive much benefit by the use of this water, though the inhabitants of this place will tell you stories enough, very confidently and circumstantially, of lately done miraculous cures by the use thereof; but I have learned, that to distrust is *nervus sapientiæ*. Leaving Haliwell that night, I reached St. Asaph, a bishop's see, where there is a very poor cathedral church, covered with shingles or tiles, excepting one of the isles, where also the lead is fallen off, which yet is esteemed here a stately fabric.

August the 26th, I went to Aberconwey, a pretty little town in Carnarvonshire, inclosed with a high and strong wall. Here is a castle standing on a rock, within the water, of great strength, and which, as they told me, held out the last for the king. Here the assizes were now holden. The place is but poor, as is generally all the country; though about St. Asaph there is a very pleasant, and, I believe, fruitful vale.

August the 27th, I made for the Isle of Anglesey, and riding over the sands, under a high rock, called Penman Daughan and over another, called Penman Mawr, in a narrow and somewhat dangerous way, there being a very steep precipice into the sea on one hand; I yet missed the opportunity of the sands to go over to Beaumaris,

and was forced to go round by Bangor, another episcopal see, but a small village, and the cathedral a mean one. I passed the ferry at Porthaithwyth, into the Isle of Anglesey, and lodged at Beaumaris, a pretty little town, having a handsome strong castle. The Welch people generally are extremely civil and well bred, very honest and courteous to strangers.

August the 31st, I removed to Carnarvon, passing over the ferry just named. Carnarvon is a small town, walled about with a tall but slight wall. The castle is large, hath formerly been considerable for its strength and beauty, but now is quite gone to decay; Edward II was born in it.

September the 1st, I left Carnarvon, intending for Snowden, having, for that purpose, hired a guide to conduct me to the top of the hill. But it rained so hard, and the weather proved so bad, that I was forced, within a mile of the town, to take shelter in a small cottage. After that I proceeded to the foot of the hill, where my guide desponding, and being somewhat late, I was forced to dismiss him. This night I lodged at Bethkellert.

September the 2d. At Bethkellert I hired another guide to the top of Snowden; we marched up on foot about four miles. The top of the mountain was covered with clouds, so that I lost the prospect usually taken from thence of the adjacent country. Divers rare plants I found on the top and sides of the hill, which were then strangers to me, de quibus consule catolagum.

September the 3d, I rode from Bethkellert to Bala, in Merionethshire, a long and bad way, though accounted but twenty miles. The assizes were then held there.

September the 5th, I rode to Dolgehle, a small town, where I first heard of the observations of an Oxford scholar concerning that town, since printed in 'Fuller's Worthies.' It stands under an hill called Caderidris, said to be three miles high, which I ascended, from whence I had a fair prospect of the country round about. I found no new plants, save the globe flower [*Trollius*

Europæus, Linn.], cypress moss [*Lycopodium alpinum*, Linn.], and another small club moss [probably *Lycopodium selaginoides*, Linn.] with white seeds.

September the 6th, I travelled to Mahentler, and thence to the Silver Mills, where I saw and learned the whole process of the work of melting and refining of silver. They have two sorts of ore, the one rich of Dorrens and Consomlogh, the other poorer of Talabont. They mix these, six parts of Dorrens ore with four of Talabont, because Dorrens being rich, will not melt off the hearth without such a quantity of the Talabont. Then they carry it in a barrow from the storehouse to each smelter's several bing, where it is melted with black and white coal (that is, sticks cut into small pieces, then slit and dried;) but the whole of this I had afterwards more exactly in my fourth voyage.

September the 7th, I directed my course to Shrewsbury, and lodged at Llanver, short of Welch Pool; where I first heard of the death of Oliver L. Protector.*

September the 8th, I rode through Welch Pool to Shrewsbury. This town is as large as Cambridge, fair, well built, compact, walled almost round with a thick and strong wall (as walls go in England,) yet but low. It hath a castle, six churches, a great free-school, having four masters, and a brewhouse noted for its bigness. Shrewsbury cakes are much esteemed.

September the 12th, I travelled to Kidderminster; and from thence proceeded on to Worcester. This town is large, hath a fair cathedral, within side very handsome, but is decaying apace. There are in it three or four good streets, but no very good market-place. It is in strength inferior to Shrewsbury; for greatness and beauty equal. By the way, as I came hither, I passed Bridgenorth, where I saw a fair street of new-built houses, and divers little houses cut out of the rock, particularly a great wine cellar, which deserves to be seen. I had a prospect of Worcester from the steeple of the cathedral.

* Cromwell died on the 3d September, 1658.

In the choir is a monument of King John, with a crown on his head, lying between two bishops. No inscription, but only on the top of his head, within the crown, "Johannes Rex Anglie," which I suspect to be of a later date. Here is also a monument to Prince Arthur, inscribed, "Here lieth Prince Arthur, the first-begotten of Henry the 7th, &c., who died in the 17th year of his age, and in the year of our Lord 1502."

September the 13th, I rode to Gloucester, where I saw the great church, and therein the monument of Robert de Courtois, his effigies in wood lies cross-legged; also the monument of one John Jones, who had been thrice mayor, and secretary to six bishops, who died the morrow night after that his monument was finished; another of Edward II, but a poor one for a king. I saw also the whispering-place, and the new library. There is the fairest and largest cloister that I had anywhere observed. The town consists principally of two streets crossing one another.

September the 14th. From Gloucester I set forward for Cambridge, lodging the first night at Stow in the Wold. The next day passing through Banbury, I reached Foster's Booth that night. I had thoughts of getting to Cambridge the next day, but through defect of my horse I fell short, and was forced to take up at St. Neots, where I rested Sunday, and on Monday finished my voyage, arriving at Cambridge the 18th about noon.

ITINERARY II.

July the 26th, 1661, we* began our journey northwards from Cambridge, and that day, passing through Huntingdon and Stilton, we rode as far as Peterborough, twenty-five miles. There I first heard the cathedral service. The choristers made us pay money for coming into the choir with our spurs on.

* Mr. Willughby was one of the company.

July the 27th, we rode on to Crowland, six miles; there we viewed the famous abbey church, so much of it as is yet standing. The roof within, covered with wood, hath been curiously gilded; and round about on the sides, underneath the roof, are artificially carved many species of animals, both beasts and birds. In the time of the late wars this church was made a garrison, and held for the king. When it was taken by the parliament, one of the soldiers, affrighted, got up to the top of the church above the woodwork wherewith it is covered, and walked along till he came to a place where wanted a board, there, whether casually slipping down, or voluntarily (or being astonied by the soldiers calling upon him to come down,) hung a long time by the arms into the church, which is of great height; till at last, being weary, he fell into the church, but yet was not so dashed to pieces with the fall but that he lived a day or two. This church seemeth to have been built cathedral-wise, but now there remains only part of the body of the church, the choir and cross building being all fallen down. Crowland is noted for a bridge,* standing on the confluence of two waters upon three feet, without any pillar in the middle to support it. From Crowland to Spalding we rode upon a very firm bank for the space of eight miles, lately thrown up by Colonel Walton. We observed at Spalding Sir Anthony Oldfield's house. The town is well built and handsome, such as no man would hope to find in such fens and plashes as environ it on all sides, especially not having the benefit of the sea. From Spalding to Boston, twelve miles, very good way in the summer, and exactly level, without the least hill or rising. By the way we observed, that generally all along the ridges of their houses and the corners (which houses are covered with thatch of straw or reed, and the ridges and corners made up with clay,) they plant house-leek in great plenty, whether for ornament or use we did not

* The form of this bridge may be seen among Messieurs Bucks 'Views of Castles,' &c. in England.

enquire. At Kirkton, a village near Boston, there is (which Camden also taketh notice of) a very fair church, built cathedral-wise. This town gives original and name to that sort of apples which are called at Cambridge corruptly Girton pippins, of a very pleasant taste. It's truly observed by Camden, that in Holland, in Lincolnshire, and generally in all the fen countries, the churches are very fair, and built of stone, though the country thereabouts, for many miles, scarce affords a pebble.

July the 27th, and the 28th being Sunday, we lodged at Boston. The town for that country is large, populous, and hath a good trade. The church is fair and great. The steeple, for a tower, the tallest that ever I saw; standing in a level country, it may be seen for many miles, and is also a sea-mark. From the ground to the highest top the ascent is of 364 steps. The lead lanthorn (as they call it) is uncovered, and raised above the leads to a very considerable height, viz. seventy-nine steps. There is a kind of Exchange which they call the Mart-yard (by Camden called the Gild,) and a free school, and some other buildings which we took notice of. The town is governed by a mayor, twelve aldermen, &c.

July the 29th, we rode from Boston through Lincoln, to a place called the Spittle, thirty-four miles. By the way we passed Tattershall, where there is a castle belonging to the Earl of Lincoln. This, of a market town, is the meanest that I have seen in the south of England. In Tattershall Park we first discovered *Pneumonanthe* [*Gentiana Pneumonanthe*, Linn.], which afterwards, on many heathy grounds, we found both in Lincolnshire and Yorkshire. We passed very bad ways, and had like to have been laid fast in a place called my Lady's Hole, in a rotten marshy ground near Tupham Abbey. As we proceeded towards Lincoln we saw, on the left hand, the ruins of Bardney Abbey, and on the right of Berlins we passed over a great water, at a place called the Short Ferry. At Lincoln we viewed the cathedral, which is, indeed, a very beautiful building, with a double cross.

We ascended one of the steeples, of which the church hath three; one whereof hath in it five bells, the second six, and the third only Tom. The choristers in this church had no surplices, but only gowns with capes faced with lamb-skin. We saw the great bell just mentioned, called the great Tom of Lincoln, cast in the year 1610. Here we found it true, minuunt præsentia famam. From this steeple we had a prospect of the city, which now consists only of one long street. It is a mean and poor place; not well built; of little trade; many of the churches fallen down; of no strength. In this city we saw a bowling-green, in the bottom of a pit or pond, which one would suspect should, in the winter time, be filled with rain, and turned into a standing pool of water. The town being full of tumult, by reason that the assizes were there that day, we staid not all night, but rode on ten miles further to the Spittle, where we found but bad accommodations, because the inn there had a little before been accidentally burnt down.

July the 30th, we went on from the Spittle to Glandford-bridge, ten miles, and thence to Barton upon Humber, eight miles, from whence we ferried over ourselves and our horses to Kingston upon Hull, five miles. At Hull we were received by soldiers, conducted to the main guard, and examined by one Captain Widdrington, who was then upon guard; who afterwards came to our inn to visit us. In the morning we went to see the great church (which the clerk told us was called St. Trinity's.) The choir is very fair and large, but built of brick. The pillars in the church and choir very slender, so that the whole is lightsome. It is built in the form of a cathedral, and hath, according to the statute, a suffragan bishop. Every one that is buried here gives five shillings and sixpence towards the repair of the church. From the steeple we had a prospect of the town, which is fair and well built, every street paved handsomely. It is fenced with a strong brick wall, and a double ditch, with an high earthwork between them.

The country round about is an exact level for five miles from the town every way, and they say may be overflowed, by cutting the banks at full sea, and letting in the water, so that the town is very strongly situate and fortified, nature and art conspiring to make it impregnable. We observed, in a close near the town called Granswick, great store of carum [*C. Carui*, Linn.] It grows in many places about this town, and in some places of the fens in Lincolnshire. In this town there is a foundation called Trinity House, which is a society of merchants, and to it belong good revenues. There are maintained thirty poor women, called sisters, every one of whom hath a little chamber or cell to live in. This building consists of a chapel, two rows of chambers below stairs for the sisters, and two rooms above stairs, one very fair, where the brethren of the society meet, in which hang many tables of orders for the society's government; another large chamber where they make sails, in the middle whereof hangeth the effigies of a native of Groenland,* with a coat of skins upon him, sitting in a very small boat or canoe, covered with skins. He hath, in his right hand, a pair of wooden oars, wherewith he rows his boat; in his left a dart, with which he strikes fish; on his forehead a thing like a trencher, which serves as a *bonne-grace* to fence his eyes from the sun, and it may be too, from the dashing of the water. Behind him lies a bladder or skin-bag, in which we suppose he bestowed the fish he caught. (Some told us it was a bladder full of oil, with which he used to allure the fish to him.) The boat is covered over with the same it is made of, excepting one hole wherein he sits, just fitted to his body; so that when he sits in it, his legs, and lower part, are under cover or deck; the boat is thus contrived, that when it shall be plunged by a wave it may rise again, no

* Mr. Ray, in p. 25 of his 'Foreign Travels,' takes notice of seeing a Groenland man in his boat, hanging in the entry of the Chirurgical and Anatomical Theatre in Delft; and there mentions seeing the same in the Trinity House in Hull.

water getting into it. This was the same individual canoe that was taken, with all its furniture or remex, anno 1613, in the sea, by Andrew Barker of Hull. The Groenlander taken refused to eat, and died with hunger and sullenness in the space of three days. A great whalebone lies at the door of the Trinity House. We saw the water-house, which furnisheth the whole town with fresh water. The water is drawn up by horses into two cisterns, by a device which I had not before observed. We viewed also the free-school, over which are two rooms, one in which the merchants have their feasts, another with seats, wherein they meet to confer. The town is governed by a mayor and twelve aldermen. The mayor hath a large mace borne before him on festival days, and a cap of maintenance, and a small mace for ordinary days; also two swords, the lesser given by King Richard II, the larger by Henry VIII, but one borne at a time. There is also a small mace for the water bailiff; also another little one called the blood-wipe, which they use in parting of frays, and he that draws blood of another forfeits a noble to the mayoress. Besides these is a wooden ensign like a knife, called the admiralty mace, with which the water-serjeant arresteth ships. At the mayor's house is kept a fair cupboard of public plate belonging to the town. The principal commodities (exported at least) wherein the town's trade consists, are lead, brought hither out of Derbyshire, and cloth for sails. This town furnisheth the greatest part of Yorkshire, and the adjoining countries, with wines. We saw a public building near the river Hull, which they called the Exchange. On the further side of the river Hull stand three forts; one called the North Blockhouse, the middlemost the Castle, and the third the South Blockhouse, all three garrisoned with soldiers, and built of brick. The South Blockhouse, which commands the Humber, is in good repair, the other two somewhat decayed. On the tops of the walls of this last we observed the common pink [either *Dianthus caryophyllus* or *D. plumarius*,

Linn.] growing in great plenty. King Henry VIII, his house, called the Manor, is now the magazine. Hull is noted for good ale. The town of Hull was (they say) of old time, a small village called Wike, till the merchants, leaving the Spurne or Sprun, which is the utmost point of Holderness, upon the sea, because the sea daily encroached upon their town there, came and seated themselves here, twenty miles higher up the Humber: thence came Hull to its growth and riches. The governor of the town, at our being there, was the Lord Bellasis. There is an old saying,

"When Dighton is pulled down,
Hull shall become a great town."

This Dighton was a village close by the town, pulled down in the time of the late wars.

August the 1st, we proceeded on our journey from Hull, through Beverley, to Selby, twenty-seven miles. At Beverley we staid to see the minster, a very fair building, the roof an arch of stone. It hath a double cross building, one in the choir. The seats in the choir were canopied over with very good carved wood-work with little statues, which are now taken away. In the church are several monuments of the Piercies of Northumberland, the earls whereof have added a little chapel to the choir, in the window whereof are the pictures of divers of that family, curiously painted in the glass. At the upper end of the choir, on the right side of the altar, stands the Freed-stool, of one entire stone, which was formerly a sanctuary, said to have been brought from Dunbar in Scotland, and behind it, in the wall, a well of water. At the upper end of the body of the church, next the choir, hangs an antient table, in which are the pictures of St. John (from whom this church is named) and King Ethelstan the founder thereof. Between them this distich,

"As free make I thee
As heart may think or egh may see."

King Charles I, coming into the church, and reading those verses, is reported to have added,

"Even so free be."

Hence of old the inhabitants of Beverley pay no toll or custom in any city, town, or port in England. In the body of the church we observed an antient monument, called the virgins' tomb, because two virgins, sisters, (whose names they could not tell us,) were buried there. These virgins gave to the town of Beverley a piece of land, into which any freeman of the town may put three milch kine from Lady-day to Michaelmas. At the lower end of the body of the church stands a very large and fair font of agate stone. This town is large and long; hath a spacious and handsome market-place; there have been antiently in it four churches, some of them now fallen into decay. It is governed by a mayor and twelve aldermen. Here is the seat of the family of the Gees, whose monuments we saw in the church. The principal church of the town is St. Mary's, built cathedral-wise. In the year 1528, the steeple fell down, in the time of divine service, and beat down part of the church, and slew and wounded divers men, women, and children. This we saw cut in wood, about one of the uppermost seats in the church, "Prey ye for the soules of the men, women, and children," &c. When this church was re-edified, one Crosland, who hath a monument there, built two pillars and a half, upon which there is this inscription, (which, for Mr. Crosland's sake I copied out,) "Xland and his wife made thess to pillors and an halfe." Here are divers stories represented in picture on the roof, as particularly the legend of St. Catherine. There is an old inscription on the roof of the north isle;

"Mayn in thy lyffing lowfe God abown all thyng;
And ever thynk of the begynning what shall cowme of the ending."

From Selby we rode to Wistow, and from thence, the same night, we went onward to Pontefract. By the way

we passed through Hambleton, a small village, and had a view of Brayton Bargh (which is a hillock covered with wood,) upon occasion whereof we were told a proverbial saying or rhyme;

> "If Brayton Bargh, and Hambleton Hough, and Burton Breame,
> Were all in thy belly, it would never be teame."

At Pontefract, a large town, we saw the ruins of that noted castle* there, which, though built upon a firm rock, is so utterly demolished from the foundation, that there is little or nothing of the walls remaining. We saw the free-school, but a mean building. In Dr. Johnson's garden we found divers plants which were new to us, viz., *Solidago saracenica* [*Senecio saracenicus*, Linn.,] a kind of melitot-trefoil, a plant like *Muscipula lobelij*, [*Silene armeria*, Linn. ?] with a triangular seed-vessel, called by herbarists, *Vaccaria*, [*Saponaria vaccaria*, Linn. ?] *Scrophularia Tradescanti*, and some others. The doctor was not then at home, else it is likely we might have observed more. At Pontefract, every fortnight, on Saturday, is a market or fair kept for all sorts of cattle, from Lady-day to Michaelmas. Great plenty of liquorice [*Glycyrrhiza glabra*, Linn.,] and the best in England, is planted about this town;† also, skirrets [*Sium sisarum*, Linn.] Pierpoint's house in this town is worth the taking notice of.

August the 3d, we rode to Knaresborough, twenty miles, but long ones, the way mountainous. We passed through Castlefyrth (Castleford), an antient town, about three miles from Pontefract, where are sometimes digged up antient Roman coins, some we gathered up among the people who had found them. We passed also the river Calder at Medley bridge; by the way we had a prospect of Leadston Hall, belonging to Sir John Lewis, and another great house of the Blands on the right hand. Then we rode through a bushet, or common, called Rodwell Hake,

* Messieurs Bucks have published a print of this famous castle, from a drawing taken during the siege.—G. S.

† This plant is still grown at Pontefract, and in the town they prepare the liquorice, which is sold in the shops under the name of Pontefract or Pomfret cakes.—E. L.

two miles from Leeds, where (according to the vulgar tradition) was once found a stag, with a ring of brass about its neck, having this inscription,

"When Julius Cæsar here was king,
About my neck he put this ring;
Whosoever doth me take,
Let me go for Cæsar's sake."

Thence we had a prospect of the Red Hall at Whitkirk, belonging to Sir Arthur Ingrame, where King James was said to be begotten. At Leeds (a large and rich town, which hath a great trade for cloathing) we saw the new church, which had been lately built by one Harrison, at his sole charges, without accepting so much as a day's work from any man. This Harrison, from a poor boy, came to great estate, the most whereof he bestowed in building this church, and almshouses for thirty poor persons, which are near the church. He is much commended there for his justice, temperance, and charity. At Knaresborough, on the river Nid, we saw divers memorable things, as, first, St. Robert's chapel, a little thing having an altar in it, all hewn out of the living rock; on the outside, at the door, is the statue of St. Robert, cut out of the rock. The old woman, who in a great measure gets her living by showing strangers this chapel, told us many stories out of the legend of St. Robert; some of which, because we had before heard the story of that saint, we thought fit to commit to writing. King John, then, when he lived in the castle of Knaresborough, sent once for this St. Robert, who happening to be at his devotions in this his chapel, refused to go with the messengers. The messengers returning to the king with a denial, were sent back again to tell St. Robert that he must leave off his devotions and come to the king, or else that he would come and fetch him. St. Robert still refusing to go, sent the King an ear of corn, with these words, that he was serving him who made that, and unless he could make such another, he would not attend on him till he had finished his devotions. A second

legend of St. Robert is this: St. Robert going to the king, complained to him that his deer in the forest of Knaresborough did the poor men's corn much harm; the king merrily asked him, why they did not pound them? whereupon St. Robert catcheth two of the stags, and putteth them into the pinfold; the king wondering at it, asks him what he would desire in recompense for the poor; the saint answered, only as much land as he could plough round with two stags, in the time of divine service. The king granted his request, he encompassed a great quantity of land, which is now in the occupation of the Slingbyes. The picture of the plough and bucks is in one of the church windows at Knaresborough. Another legend of this saint is, that a certain fellow feigned himself a cripple, had tied up one of his legs, and came to beg something of St. Robert, making great complaint of his lameness and poverty. St. Robert being very compassionate and charitable, saith to him, I have nothing left but one cow, and that give I thee, as freely as ever God gave it me. Whence it is to this day a proverb among them thereabout, "As free as St. Robert gave his cow." So soon as the fellow took the cow by the horn to lead her away, he proved a cripple indeed, and could not let down his leg. The picture of this also is in one of the church windows. Sir Henry Slingsby his monument, built by himself before he was beheaded, is in this church of Knaresborough. We went to see St. Robert's well, about a mile distant from the town. Hence we went to the dropping-well, so called, because it falleth from a cliff or precipice not far from the river; it riseth in the field a good distance from the place, where it falls down the high bank; and any other running water that falls down a precipice might as well be called a dropping-well. Any dry thing the water covers over with a crust or bark of stone; but soft, spongy, and succulent things (into which it can soak and insinuate itself, as moss, green leaves, earth, &c.) it seems to convert into stone, or at least, the water petri-

fying in the pores of them, makes the whole seem to be stone.

August the 5th, we went to the spaw at Herrigate (Harrowgate), and drank of the water. It is not unpleasant to the taste, somewhat acid and vitriolick; galls turn it into a dark blue, somewhat purplish; it works chiefly by urine. Then we visited the sulphur-well, whose water, though it be pellucid enough, yet stinks noisomely, like rotten eggs or *sulphur auratum diaphoreticum;* it tastes very salt, and upon evaporation (as we were told) leaves behind a copious fixt salt. Silver put into it is suddenly changed into a golden colour, and being left awhile in it becomes blackish. Thence we went to St. Mugnus* his well at Copgrave, whither a great number of poor people resort to bathe themselves; they put on their shirts wetted in the water, letting them dry upon their backs. This water operates (if at all) by its extraordinary coldness and astringency. Near St. Mugnus is a well of great virtue for the eyes, which they call the eye-well. We thought it not worth the while to spend much time to make observations about these waters, because they are already the subject of two little treatises, one by Doctor Deane, the other by Dr. French, who (especially the latter) have written well and to the purpose, with much fidelity, of the properties and virtues (together with their causes) of all these waters. The same day we viewed Rippon, a pretty town, having a large square market-place; the minster there is much inferior to Beverley minster; one of the steeples lately falling, broke down the roof of one wing of the church, so that the whole is now much out of repair. In a vault, under the body of the church, called St. Willfrid's chapel, we saw the hole through a wall, which they call St. Willfred's needle, whereby the priests of old were wont to try women's chastity. She that was a virgin easily creeping through, but she that was corrupted†

* But, according to Camden, St. Mongahs.

† An old writer has observed, "However the thing may seem a fable at first sight, yet if the women that have played false be with child, it may be true without wonder."—G. S.

sticking fast by the way. Here we omitted the sight of Fountain's Abbey, where Robin Hood's* bow is kept; a very pleasant and delectable situation; as also of St. Willfrid's well, the tutelar saint of this town. We were there the day after St. Willfrid's Sunday, which is esteemed by the inhabitants a great festival, and thereon was wont to be held a great fair after evening prayer. Leaving Rippon, we passed the same day to Borough Bridge, where we viewed the three stones called the Devil's Bolts or Arrows by the vulgar, and about which they have a legend; they are tall and slender, four square, of a pyramidal figure, but not very sharp at the top; they seemed to us to be factitious stones, but yet endure the weather exceeding well, and may, in probability, stand there till doomsday. About a mile hence, at a place called Aldburgh (a small village now, but of old a good Roman town, and as yet a borough,) we gathered up among the people divers antient Roman coins, both brass and silver, which are daily found in the ploughed fields, and about the streets there. Those pieces that have radiate crowns on the heads of the effigies, they call Saracens' heads, all the rest Aldburgh half-pennies. Here we saw a piece of the antient Roman pavement, perhaps that which they called tessellatum. The pieces of the pavement which we saw were about two inches diameter, not perfectly square, but of the form of a lozenge, some red and some black, which we suppose were marble. This night we lodged at a small village called Hamerton, about six or seven miles from York.

August the 6th, we rode back again to York; there first of all we visited the minster, which is indeed a large and stately fabric, but in some things inferior to Beverley minster, viz., in the multitude of the marble pillars, and in the arched roof of stone. The body of the church and choir is very broad, the lantern high and large, which we ascended by 274 steps, many of them high ones. The

* This outlaw lived in the reign of Richard I.

front of the choir, respecting the body of the church, is adorned with the statues of all the kings of the house of York carved in stone. It is said, there is a large vault under the choir, and from thence a passage to Ouse bridge. There are divers antient monuments in the church, but none very sumptuous; at the east end, the tomb of Tobias Matthews, archbishop, who gave his library to the church. We searched for, but found not, the grave-stone of Winwall, on which was this inscription in Latin, "Musicus et Logicus Winwall hic jacet ecce Johannes. Organamque loqui fecerat ille quasi;" which a certain witty gentleman thus rendered into English:

"Musician and logician, John Winwall lieth here,
The organs for to speak, that made even as it were."

They have still preserved in this church their fair communion plate, most of it given by King Charles I. There is also a common prayer book and a bible with gilded silver clasps and bosses, given by the same king; and on the inside of the clasps is inscribed, "Ex dono Regis Caroli, 1633." In the wall of the vestry is a well of very sweet and pleasant water, called St. Peter's well, which tastes almost like milk. There is a large octagonal chapter-house of twenty-one yards diameter, at the door whereof is that verse, mentioned by Heylin,

"Ut Rosa flos florum,
Sic est domus ista domorum."

York is a large city and indifferently well built, the streets handsome, but narrow; it hath twenty-four churches in it. We observed the great arch of Ouse bridge, but could not exactly measure the breadth of it, but guessed it to be about twenty yards. We remarked a house on the pavement so over-hung, that the top of the building projected five yards beyond the foundation. The city of York is governed by a lord-mayor, twelve aldermen, twenty-four assistants, eight chamberlains, sixty-four common councilmen, and two sheriffs.

August the 7th, we directed our course for Scarborough, and that night lodged at New Malton, thirteen miles from York. We passed by Kirkham Abbey, and at a distance saw Croke Castle, and Sheriff Hutton Castle, The country about York is near a level every way, for at least ten miles' riding. There is at Malton a small spring which seems to be of the same nature with the Knaresborough spaw; it is ill kept, and no plentiful spring. At this town is a famous horse fair, kept on September the 29th,and for the best saddles. Here is a good house of the Lord Eures.

August the 8th, we arrived at Scarborough, distant from Malton sixteen miles. This town hath a great trade of fish taken thereabout. We saw ling, [*Lota molva;*] cod fish, [*Morrhua vulgaris;*] skate, [*Raia batis;*] thornback, [*Raia clavata;*] turbot, [*Rhombus maximus;*] whiting, [*Merlangus vulgaris;*] and herring, [*Clupea harengus.*] They take also conger, [*Conger vulgaris;*] bret, [meaning spotted, a name for the brill, *Rhombus vulgaris;*] haddock, [*Morrhua æglefinus;*] and mackrell, [*Scomber scomber.*] They have an artificial harbour or pier, made of vast stones, piled one upon another without cement, for security of their vessels of trade. The like, though not so large, is at Lyme, in Dorsetshire, called the cob. We observed in ling the *intestina cæca*, which they call kelk, to be larger and fewer in number than in the cod-fish. The turbot hath three large *intestina cæca* a little below the stomach, which is also very large. We saw there among others, a long, large, cartilaginous fish, which they call a hay, [or hoe, a northern name for the picked dog-fish, *Acanthius vulgaris;*] not much unlike (they say) to a dog-fish. The haddock [*Morrhua æglefinus*] is somewhat like to a whiting, [*Merlangus vulgaris,*] but larger; it hath a great head, *pro ratione corporis*, and large eyes; it is marked about the middle of the body with a black spot on each side, about the bigness of a three-pence, which (they say) is the print of St. Peter's thumb and fore-finger, between which he took up that

fish and marked it for himself. We saw here two sorts of starfishes, [*Asteriadæ?* Common cross fish, *Uraster rubens?* Common sunstar, *Solaster papposa?*] the common one with five *radii*, and another which hath ordinarily thirteen, sometimes fourteen, as we observed in one or two. Here is a piece of a castle standing upon a high cliff, hanging over the sea on one side, and the town on another; a place of great strength, and still held with a garrison; there is a well of fresh water within half a yard of the edge of the top of the cliff,* only a hill, about half a mile or more distant, matches, if not exceeds it in height. We drank of the spaw water there, which, by report of those who have tried both, is more nimble in its working than the Knaresborough water, and purges more by stool. The powder of galls presently turns it to a murry or purplish blue colour, not much unlike to the syrup of violets, and by standing (as Dr. Witty observes) an hour or two, we found that it would grow clear again, and precipitate to the bottom such a coloured powder in great quantity. We tried also to coagulate therewith boiling milk, which by boiling awhile together it did, yet but faintly, and made us a posset not unpleasant to drink. The well is at the foot of the cliff by the sea-side, about half a mile from the town southward. On the shores hereabout are found clear white pebbles, which by jewellers are polished and cut in the manner of diamonds, and placed in rings.

August the 9th, from Scarborough we journeyed to Whitby, twelve miles; the way stony and uneven; much like the peak ways in Derbyshire. We passed by a little village called Robin Hood's Bay, near whereto, on the ascent of the hill, by the way-side, we took notice of a vitriolick well, of the same taste with the spaws, so far as we could judge. Upon the shores about Whitby, we found long sea-laces [*Chorda filum.* Lam.] of a yellow colour, of about one yard and a half in length, and smallest at both ends, cast up by the working of the sea,

* See Dr. Witty's book.

somewhat bigger than the largest packthread commonly sold in shops. Also two sorts of *Fucus marinus*, besides the common *Phasganoides* [*Alavia esculenta*, Bory ?] The one [*Laminaria saccharina*, Lamour,] ariseth with a round stalk about the bigness of a finger, more or less, and about a foot long, and then follows one only single undivided broad leaf of a yard or more long, and sometimes three or four inches broad, wrought as it were all along with extuberant lines waved to and fro; it somewhat resembles a broad wrought leathern girdle or belt; the other, which is the *fucus marinus secundus*, Dod. Park. [*Himanthalia lorea*, Lyngb.] is branched at some distance from the root, and narrow, resembling thongs of whit-leather. A little above the rest we found, in all that we observed, a round circle like a rotula about the stalk, of about an inch diameter or more, of the same substance with the fucus, but thinner. This plant might be better expressed by a figure than described by words. All along in the cliffs and on the shore, are found in great plenty the serpent-stones, called by naturalists in Latin *cornua ammonis*. We were somewhat puzzled to get them entire out of their matrices, the usual way of heating them in the fire very hot, and then quenching them in the water, not always succeeding; many of these stones were imperfect. In this cliff or rock (which is nothing but alum-mine*) we found also plenty of the *lapides belemnites*, or thunder-stones. Another sort of stones we found there resembling cockles, or rather a sort of muscles. There is also *lapis gagates* or jet, found in the cliffs hereabout; but we met not with any besides a stone, which is, or resembles brass-mine. The country people hereabout told us the story related by Camden, that wild geese, if once they light in Whitby strand, cannot rise again or fly away, as the rhyme is:

> "If the wild goose lights in Whitby strand,
> The least bearn that is, may take her up in his hand."

* The term "mine" was formerly used as "ore," and here refers to the lias beds of Whitby, which contain alumina.—E. L.

Here hath been a very large and fair abbey, the church whereof is yet standing almost entire. This belongs to the Cholmondeleys. There are the same sorts of fish taken at Whitby as at Scarborough; and some others they named to us, as dabs [*Platessa limanda,*] billards, [?] whitemawes, [?] sword-fishes [*Xiphias gladius,*] seals, &c., which we saw not. Near this town are one or two alum works.* The process of making alum we partly saw, and partly received by relation from the workmen. In the alum-mine are found very hard round stones, which the workmen call catsheads, *ob similitudinem.*

We saw here all along the shores the people making of kelp, which they do by laying the *alga* and *Fucus marinus* on heaps, and when it is dry, burning it; while it is burning, they stir it to and fro with an iron rake, and so it condenses and cakes together, in the manner we see kelp; whereas, should they not stir it, it would go to ashes, as other plants burned use to do; *si fides autoribus.*

Whitby hath a very fair and commodious haven; about sixty ships of eighty tons a-piece or more belong to this town; it is governed by twenty-four burgesses. St. Hildas, by his prayers, delivered the country from snakes, which were changed into these stones,† (vide Camden;) *si credere fas sit.*

From Whitby, August the 12th, we hastened to Gisburgh,‡ where we saw the ruins of that famous abbey, the church whereof seems to have been comparable to the best cathedrals in England. We ascended the top of that noted hill, called Roseberry, or Ounsberry Topping, the top whereof is fastigiate, like a sugar-loaf, and serves for a sea-mark; it may be seen at a great distance, viz., from Stanmore, which is in a right line, above twenty miles off. From hence we had a prospect of that pleasant

* Of which an account may be seen in Mr. Ray's Collection of English Words.

† The *cornu ammonis,* or *ammonites* of the present day, which are still found at Whitby.—E. L.

‡ "Formerly (saith Camden) very famous for a beautiful and rich monastery, and may, in point of pleasantness, and a grateful variety, and other advantages of nature, compare with Puteoli in Italy." (See Bishop Gibson's edition of Camden, p. 910.)

and fruitful vale, part whereof is called Cliveland, a country noted for a good breed of horses. The ways here in winter time are very bad, and almost impassable, according to that proverbial rhyme,

> " Cliveland in the clay,
> Bring in two soles, carry one way."

Near this hill we went to see a well, celebrated for the cure of sore or dim eyes, and other diseases. Every one that washes in it, or receives benefit by it, ties a *lacinia*, or rag of linen or woollen, &c., on a shrub or bush near it, as an offering or acknowledgment. The people of Gisburgh are civil, cleanly, and well bred, contrary to the temper of the inhabitants of Whitby, who, to us, seemed rude in behaviour and sluttish. In the way from Whitby to Gisburgh, we passed by Freeburgh Hill, which they told us was cast up by the devil, at the entreaty of an old witch who desired it, that from thence she might espy her cow in the moor. On this moor, not far from Freeburgh Hill, we found *Bifolium minimum*, J. B. [*Listera cordata*, Br.] At Gisburgh there are two alum works, one belonging to the D'Arcies, the other to the Challoners, not wrought at present.

August the 13th, we observed all along in the midland, many miles from the sea, store of sea-plantain [*Plantago maritima*, Linn.] We rode to Duresme, (Durham) twenty-four miles; to wit, from Gisburgh to Stockton, where we ferried over the Tees, eight miles; by the way we saw at a distance the strong, now poor town of Hartlepool; from Stockton to Duresme, sixteen miles. Duresme is a large scattering town, but in most men's account pleasantly situate; encompassed with the river Were almost round, the remaining neck of land walled. The river is passed with three fair stone bridges; the suburbs are greater by much than the town contained within the walls and river. The cathedral church is a very plain and mean one, but a strong building, the pillars great and bulky; there is a very fair cloister yet remaining, and a number

of handsome stone buildings, which belong to the dean and prebendaries. The bishop's palace (all that he hath in the town) is the castle, where also the assizes are held. The bishop entertains the judges, here being no sheriff but himself.

August the 14th, we rode to Newcastle, twelve miles; in the way we saw Lundy Castle, a gallant building. This town is large and well built, especially about the market-place and key, where the houses, for height and show, are comparable to the houses in London. By reason of its great trade it is very populous, in multitude of inhabitants thought not inferior to the city of York. A fair stone bridge of nine arches joins it to Gateside or Gateshead, which is the name of that part of the town which lies on the south side of the river. This town is notable for four things. 1. The strength and thickness of the walls. 2. The key, which is thought to be as convenient, useful, handsome, and deep, as any in England. 3. The cross arch of stone on one of the steeples. 4. And especially the great trade of coals, salt, grind-stones exported, &c.; to which might be added the newly-built exchange and guildhall, a very large and fair room paved with black and white marble. Within the walls of this town there is an old castle, wherein the assizes for the county are held, which is not within the liberties of the corporation.

August the 15th, we travelled from Newcastle through Morpeth to Alnwick, twenty-six miles, which town is under a bailiff; every trade chooses an alderman; the chief trade is tanning. Here we saw a goodly and strong castle, well walled, and not yet run much to decay, belonging to the Earl of Northumberland. This country is thinly inhabited, very bleak and barren.

August the 16th, we rode in sight of the Holy Island,*

* When Mr. Ray, with Mr. Willisel, made a second simpling voyage (as he expresses it) into these parts in the year 1671, he remarked as follows; to wit, "July the 22d, we rode from Cheviot, or rather Waller or Wooler, to the Holy Island, nine miles, where we gathered, on the sea-shore under

but the tide served us not to pass over. Here we had with confidence asserted and confirmed to us this legend, that the ebbs are so great, and floods so low on the Lord's day, that a man in the morning may go in thither to divine service, and in the evening return home dry on foot throughout the whole year, though on other days it be impossible to do the like. There may be seen in this island a strong and almost impregnable fort or castle, and an old church. We saw also Farn Island at a good distance. The country abounds with castles, by reason of its vicinity to Scotland. The church in Holy Isle is reputed the most ancient cathedral in England, built by St. Cuthbert, whose body, by the monks of this church, was conveyed to Duresme, when the Danes pillaged and

the town, those stones which they call St. Cuthbert's beads, which are nothing else but a sort of *entrochi*.

"From the Holy Island we rode over the sands to Gosewick, and so on to Berwick, seven miles.

"We rested at Berwick Sunday, July the 23d, and in the forenoon heard one Smithson, minister here. In the afternoon we walked out to Morrington to hear a Scottish sermon, in a very small parish-church. In the Holy Island I found growing *Aparine major Plinii* [*Asperugo procumbens*, Linn.] Upon the walls of Berwick, by the sea side, *Eryfimum latifolium Neapolitanum* [*Sisymbrium Irio*, Linn.] About two miles from Berwick, by the side of a rivulet, in a boggy ground, not far from the road leading to Edinburgh, we found a sort of *Pseudo-asphodelus* [*Tofieldia palustris*, Huds. not now to be found there. See Dr. Johnston's Fl. of Berwick,] which I had never before seen, much less than that common in England, having, as I guess, white flowers in a spike, to which succeed roundish seed vessels. The stalk of the spike is naked, or not having above one leaf, the spike itself short, the root fibrous, as that of the common.

"July the 24th, we left Berwick, and rode first to Scrammerston Mill, about a mile and an half distant, where we observed the *Echium marinum* [*Lithospermum maritimum*, Linn., *Steenhammera maritima*, Reich.]; it hath a blue flower, almost of the figure of honeywort, but shorter. The leaves are small, of a glaucous colour, like to woad or hounds-tongue; for figure not much unlike the sea-beet, but less, &c. Thence we rode to a village called Bamborough, nigh to the Farn Islands, where Sir William Forster dwells. There is an old castle, standing on a rock, which was once very strong; also the ruins of an old abbey.

"The following birds build on the Farn Islands: guillimets [Guillemots, *Uria troile*,] scouts or razor bills [*Alca torda*,] counternebs [Puffins, *Fratercula arctica*,] which build in holes, and I guess them to be *Anates arcticæ clusii*, scarfs, i. e. shags [*Phalacrocorax graculus*] cornub. Cuthbert duck [Eider duck, *Somateria mollissima*,] bigger than a wild duck, of a brown colour; the drake is white on the back, the tail and feathers of the wings

spoiled the island. This night we lodged at Berwick; our journey was of about twenty-five miles. The river Tweed is here joined with a stone bridge of fifteen arches. Here hath been a very goodly castle, which is now demolished. The upper town is encompassed with a wall, which is not very strong; within this wall is a large void ground or green, whereunto the inhabitants bring their cattle, and let them stay all night, and in the morning drive them out again to pasture. The lower town is very strongly fortified with a broad and deep ditch of water, and against it an impenetrable bulwark or bank of earth, faced with freestone against the ditch. There are also for defence, four tall platforms or forts, besides external fortifications. This town is still kept with a strong garrison. There is in it a fair church, built by Oliver Protector. Here we saw in the cliff by the shore, a cave, called the Burgesses' Cave, not worth the remembering, and an hole in a rock, through which a boat may pass at full sea, called the Needle's Eye.

August the 17th, we travelled to Dunbar, a town noted for the fight between the English and Scots. The Scots, generally, (that is, the poorer sort) wear, the men blue bonnets on their heads, and some russet; the women

black, the legs also black. It hath a *posticus digitus;* the bill is scarce so long as a duck's; the superior mandible is a little crooked at the end, and overhangs the inferior: but that which is most remarkable is, that on both sides the bill the feathers come down in an acute angle, as far as the middle of the nostril below. Puffinet [Black Guillemot, *Uria grylle,*] which is as big as a pigeon, hath a small sharp-pointed bill, black in the summer, having only a white spot in each wing, but white in winter, lays two eggs, and builds in an hole under a rock. Annet [the Kittiwake, *Larus trydactylus,*] a gull, but small and white, only the tips of the wings black, yellow bill. Cattiwike [*Larus trydactylus.*] Mire Crow [*Larus ridibundus,*] all white-bodied, only hath a black head, a little bigger than a pigeon. Puets. Pickmire [another name for the same gull, though here called a tern, *Sterna hirundo,*] i.e. a sea swallow, *fortè.* Tern, a small gull, the least of all, having a forked tail. Sea-piots [Sea-piots, Sea-pies, oyster catchers. *Hæmatopus ostralegus,*] i. e. Sea-pies, as far as I could guess. Great quantity of Sea-calves [seals,] taken upon these islands, whereof the farmers make their chief profits, viz. of their oil. Kir-bird [on the Hampshire coast this is a name for the Guillemot, *Uria troile,*] a sort of Columbus, less than a magpy, black and white, and stands straight upright. Gorges, a fowl bigger and redder than a partridge."

only white linen, which hangs down their backs as if a napkin were pinned about them. When they go abroad none of them wear hats, but a party-coloured blanket, which they call a plaid, over their heads and shoulders. The women, generally, to us seemed none of the handsomest. They are not very cleanly in their houses, and but sluttish in dressing their meat. Their way of washing linen is to tuck up their coats, and tread them with their feet in a tub. They have a custom to make up the fronts of their houses, even in their principal towns, with fir boards nailed one over another, in which are often made many round holes or windows to put out their heads. In the best Scottish houses, even the king's palaces, the windows are not glazed throughout, but the upper part only, the lower have two wooden shuts or folds to open at pleasure and admit the fresh air. The Scots cannot endure to hear their country or countrymen spoken against. They have neither good bread, cheese, or drink. They cannot make them, nor will they learn. Their butter is very indifferent, and one would wonder how they could contrive to make it so bad. They use much pottage made of coal-wort, which they call keal, sometimes broth of decorticated barley. The ordinary country houses are pitiful cots, built of stone, and covered with turves, having in them but one room, many of them no chimneys, the windows very small holes and not glazed. In the most stately and fashionable houses in great towns, instead of ceiling they cover the chambers with fir boards nailed on the roof within side. They have rarely any bellows, or warming-pans. It is the manner in some places there, to lay on but one sheet as large as two turned up from the feet upwards. The ground in the valleys and plains bears good corn, but especially beer-barley or bigge, and oats, but rarely wheat and rye. We observed little or no fallow grounds in Scotland; some layed ground we saw which they manured with sea-wreck, [sea-weeds.] The people seem to be very lazy, at least the men, and may be frequently observed to plough in their

cloaks. It is the fashion of them to wear cloaks when they go abroad, but especially on Sundays. They lay out most they are worth in cloaths, and a fellow that hath scarce ten groats besides to help himself with, you shall see come out of his smoaky cottage clad like a gentleman.

There hath formerly been a strong castle at Dunbar, built on a rock upon the sea, but it is now quite ruined and fallen down. Yearly, about this time, there is a great confluence of people at Dunbar to the herring fishing; they told us, sometimes to the number of 20,000 persons; but we did not see how so small a town could contain, indeed give shelter to such a multitude. They had at our being there two ministers in Dunbar; they sung their *gloria patri* at the end of the psalm after sermon, as had been ordered by the parliament, in these words:

> "Glore to the Father and the Sonne,
> And to the Holy Gheast:
> As it was in the beginning,
> Is now, and aye doth last."

There is in the church a very fair monument of the Earl of Dunbar, George Howme, made in King James's time.

August the 19th, we went to Leith, keeping all along on the side of the Fryth. By the way we viewed Tontallon Castle, and passed over to the Basse Island, where we saw on the rocks innumerable of the soland geese,* [the gannet, *Sula alba*, should be written solent goose, i. e. a channel goose.] The old ones are all over white, excepting the pinion or hard feathers of their wings, which are black. The upper part of the head and neck, in those that are old is of a yellowish dun colour; they lay but one egg apiece, which is white and not very large. They are very bold, and sit in great multitudes till one

* "In Scotiâ anatum, seu anserum genus, bernacles, ex conchis aut arboribus vulgo nasci perbibetur." *Ex Everardi Ottonis Notitiâ præcipuarum Europæ Rerumpub.* Cap. iv. sect. i, p. 297. This name of bernacles, as applied to the soland goose, explains what Cleaveland, in his satyr upon the Scotch, means by feeding on bernacles.

comes close up to them, because they are not wont to be scared or disturbed. The young ones are esteemed a choice dish in Scotland, and sold very dear (1*s.* 8*d.* plucked.) We eat of them at Dunbar. They are in bigness little inferior to an ordinary goose. The young one is upon the back black, and speckled with little white spots, under the breast and the belly gray. The beak is sharp-pointed, the mouth very wide and large, the tongue very small, the eyes great, the foot hath four toes webbed together. It feeds upon mackrel and herring, and the flesh of the young one smells and tastes strong of these fish. The other birds which nestle in the Basse are these; the scout, [razor-bill, *Alca torda,*] which is double ribbed; the cattiwake, [is a gull kittiwake, *Larus trydactylus,*] in English, cormorant, [*Phalacrocorax carbo,*] the scart, [scarf, the shag, *Phalacrocorax graculus;*] and a bird called the turtle-dove, [black guillemot, Greenland dove so called, *Uria grylle,*] whole footed, and the feet red. There are verses which contain the names of these birds among the vulgar, two whereof are,

> "The scout, the scart, the cattiwake,
> The soland goose sits on the lack,
> Yearly in the spring."

We saw of the scout's eggs, which are very large and speckled. It is very dangerous to climb the rocks for the young of these fowls, and seldom a year passeth but one or other of the climbers fall down and lose their lives, as did one not long before our being there. The laird of this island makes a great profit yearly of the soland geese taken; as I remember, they told us 130*l.* sterling. There is in the isle a small house, which they call a castle; it is inaccessible and impregnable, but of no great consideration in a war, there being no harbour, nor anything like it. The island will afford grass enough to keep thirty sheep. They make strangers that come to visit it burgesses of the Basse, by giving them to drink of the water of the well, which springs near the top of

the rock, and a flower out of the garden thereby. The island is nought else but a rock, and stands off the land near a mile; at Dunbar you would not guess it above a mile distant, though it be thence at least five. We found growing in the island, in great plenty, *Beta marina*, [*Beta maritima*, Linn.;] *Lychnis marina nostras*, [*Silene maritima*, With.;] *Malva arborea marina nostras*, [*Lavatera arborea*, Linn.;] and *Cochlearia rotundifolia*, [*Cochlearia officinalis*, Linn.] By the way also we saw glasses made of kelp and sand mixed together, and calcined in an oven. The crucibles which contained the melted glass, they told us, were made of tobacco-pipe clay.

At Leith we saw one of those citadels built by the Protector, one of the best fortifications that ever we beheld, passing fair and sumptuous. There are three forts advanced above the rest and two platforms. The works round about are faced with freestone towards the ditch, and are almost as high as the highest buildings within, and withal thick and substantial. Below are very pleasant, convenient, and well-built houses for the governor, officers, and soldiers, and for magazines and stores; there is also a good capacious chapel, the piazza, or void space within, as large as Trinity College (in Cambridge) great court. This is one of the four forts. The other three are at St. Johnston's, Inverness, and Ayre. The building of each of which (as we were credibly informed) cost above 100,000*l.* sterling; indeed, I do not see how it could cost less. In England it would have cost much more.

At Edinburgh we went to the principal public buildings; those are, 1. The castle, a very strong building on a precipitous solid rock; it is one of the king's houses, but of no very great receipt; in it are kept the crown and sceptre of Scotland. There was then lying in the castle yard an old great iron gun, which they call Mount's Meg, and some, Meg of Berwick, of a great bore, but the length is not answerable to the bigness. 2. Heriot's

hospital, a square stone building, having a large turret at each corner. It hath very spacious and beautiful gardens, and is well endowed. There is a cloister on both sides of the court, on each hand as one goeth in, and a well in the middle thereof. At our being there it maintained threescore boys, who wore blue gowns; but they told us it was designed for other purposes. It would make a very handsome college, comparable to the best in our universities. Over the gate, within side, stands the figure of G. Heriot, the founder thereof, and under him this verse,

"Corporis hæc, animi est hoc opus effigies."

3. The college, for the building of it but mean, and of no very great capacity, in both comparable to Caius College in Cambridge. Most of the students here live after the fashion of Leyden, in the town; and wear no gowns till they be laureat, as they call it, that is, commence. At our being there (being the time of the vacancy) there was not a student in town; the premier also, as they call him, was absent at London. In the hall of this college, the king's commissioner, Middleton, was entertained by the citizens of Edinburgh. 4. The parliament house, which is but of small content, as far as we could judge, not capable of holding 200 persons. The lords and commons sit both in the same room together. There is also a place which they call the inner house, in which sit fifteen lords, chosen out of the house, as it were a grand committee. There is an outer room like the lobby, which they call the waiting room; and two other rooms above stairs, where commissioners sit. We saw Argyle and Guthry, their heads standing on the gates and toll-booth. At the time we were in Scotland, divers women were burnt for witches, they reported, to the number of about 120.

August the 21st, we went on northward as far as Sterling, twenty-four miles. By the way we saw the king's palace at Lithgow, built in the manner of a castle,

a very good house, as houses go in Scotland. There is a small lough or standing water on two sides of the house. The lough formerly was never without swans; but Mr. Stuart, one of the bailiffs of the town, told us a strange story of those swans, which left the lake when the house was taken and garrisoned by the English; and although two were brought on purpose for trial, yet would they not stay there; but at the time of the king's coming to London, two swans, *nescio unde sponte et instinctu proprio*, came hither, and there still continue. This Stuart hath nourished in his garden divers exotick plants, more than one would hope to find in so northerly and cold a country; some such as we had not before seen, viz., *Archangelica* [*Angelica Archangelica*, Linn.,] *Fumaria siliquosa*, [*Fumaria capnoides?* Linn.,] *Carduus lacteus peregrinus flo. albo*, *Verbascum* 4 *Matth. angusti folium*, *Anchusæ species flo. parvo nigricante*, *Alcea surrecta lævis flo. amplo rubro et albo*, as we then named them. Sterling is an indifferent handsome town, hath a good market-place, two palaces, one of the Earl of Marr, the other of the Marquis of Argyle. But the castle is most considerable, and hath been, and with little cost, may be again made, a very magnificent house. It hath an hall longer, if not broader, than Trinity College Hall in Cambridge. The building, added by James V, contains many very stately rooms both for lodging and entertainment, in many of them very good carved wood-work on the roofs. There is also a chapel built by James VI, at the birth of his eldest son, in which we saw a model of Edinburgh castle, and the ship in which they served up the meat into the hall, when Prince Henry was baptized. This castle stands on an high and steep rock; under the building are many vaults cut out of the rock, and one under another. The castle, on our being there, was garrisoned with 200 English. The commissary told us that the greatest inconvenience of that castle, in case of a siege, was that upon the discharging of the great guns, the water in the wells would sink, and the wells become

dry; of which it is easy to render a probable reason. Sterling bridge is considerable for nothing, but that it is a pass. The river here, Mæander like, takes circuits, and almost meets itself again, and that for a considerable space, both on the one and the other side of the bridge; so that what is by land four miles, is by water twenty-four.

From Sterling we went, August the 22d, to Glascow, which is the second city in Scotland, fair, large, and well built, cross-wise, somewhat like unto Oxford, the streets very broad and pleasant. There is a cathedral church built by Bishop Law; they call it now the High Kirk, and have made in it two preaching places, one in the choir, and the other in the body of the church; besides, there is a church under the choir, like St. Faith's under Paul's, London; the walls of the churchyard round about are adorned with many monuments, and the churchyard itself almost covered with gravestones; and this we observed to be the fashion in all the considerable towns we came into in Scotland. The bishop's palace, a goodly building, near to the church, is still preserved. Other things memorable in this town are—1. The college, a pretty stone building, and not inferior to Wadham and All Souls colleges in Oxon. The premier, Mr. Gelaspy, was removed by the parliament there. Here are (as they told us) most commonly about forty students of the first year, which they call obedients; near so many of the second, which they call semies; and so proportionably of the third, which they call baccalors; and the fourth, whom they call laureat or magisters. It being the time of vacancy, we saw not the habits which the students use.—2. A tall building at the corner, by the market-place, of five stories, where courts are kept, and the sessions held, and prisoners, &c.; upon the door whereof is this distich:—

"Hæc domus odit, amat, punit, conservat honora,
Nequitiam, pacem, crimina, jura, probos."

3. Several fair hospitals, and well endowed; one of the

merchants, now in building.—4. A very long bridge of eight arches, four whereof are about fifty feet wide each: and a very neat square flesh-market, scarce such a one to be seen in England or Scotland.

August the 23d, we rode to Douglas, twenty miles. We passed through Hamilton, by the way, an handsome little market-town, where is a great house of Duke Hamilton's. The country all thereabout is very pleasant, and in all respects, for woods, pastures, corn, &c., the best we saw in Scotland. At Douglas there is a castle belonging to the Marquess Douglas, half a mile distant from the town; which, though it be a free burgh, and without doubt of great antiquity, yet is a pitiful, poor, small place, scarce an house in it that will keep a man dry in a shower of rain. In the church we saw some old monuments of the Douglasses, with two hearts wrapped up in lead, which, it seems, were of two of that family that died in France, and were sent over hither.

August the 24th, we rode to Dumfries, or (as they spelled it) Drumfrese, twenty-eight miles, and in the way saw lead mines, at a place called the Lead Hills, which will in time, it is likely, increase to a good considerable town. We also passed over much hilly ground; the highest place was called Anderkin Hill, upon the top whereof the air was sharp and piercing, when in the level it was warm and gentle; neither yet were we on the highest apex of it, by the ascent of near half a mile as we guessed. This hill we judged to be higher than any we had been upon in England or Wales, Snowdon itself not excepted. This is a dangerous passage in winter time, the way being narrow and slippery, and a great precipice on the one hand, besides the descent steep, so that we led our horses down about a mile. At Dumfries they have two ministers, one a young man named Campbell, related (as we were told) to the M. of Argyle, the other an elder man, by name Henderson, who has married his daughter to the younger. Campbell prayed for the preservation of their church government and

discipline, and spake openly against prelacy and its adjuncts and consequences. Here, as also at Dunbar, and other places, we observed the manner of their burials, which is this; when any one dies, the sexton or bell-man goeth about the streets with a small bell in his hand, which he tinkleth all along as he goeth, and now and then he maketh a stand, and proclaims who is dead, and invites the people to come to the funeral at such an hour. The people and minister many times accompany the corpse to the grave at the time appointed, with the bell before them, where there is nothing said, but only the corpse laid in. The minister there, in the public worship, does not shift places out of the desk into the pulpit, as in England, but at his first coming in, ascends the pulpit. They commonly begin their worship with a psalm before the minister comes in, who, after the psalm is finished, prayeth, and then reads, and expounds in some places, in some not; then another psalm is sung, and after that their minister prays again, and preacheth as in England. Before sermon, commonly, the officers of the town stand at the churchyard gate, with a join'd stool and a dish, to gather the alms of all that come to church. The people here frequent their churches much better than in England, and have their ministers in more esteem and veneration. They seem to perform their devotions with much alacrity. There are few or no sectaries or opinionists among them; they are much addicted to their church government, excepting the gentry, who love liberty, and care not to be so strictly tied down. The country abounds with poor people and beggars. Their money they reckon after the French manner. A bodel (which is the sixth part of our penny) they call tway-pennies, that is with them two-pence; so that, upon this ground, twelve pennies, or a shilling Scotch, (that is, six bodels) is a penny sterling. The Scotch piece marked with XX, which we are wont to call a Scotch two-pence, is twenty-pence Scotch, that is, two-pence sterling, wanting two bodels, or four pennies Scotch; the piece with XL is

four-pence sterling—four bodels; and so one shilling sterling is twelve shillings Scotch. Thirteen-pence half-penny English, a mark Scotch. One pound Scotch, twenty-pence sterling. One bodel they call tway-pennies, (as above) two bodels a plack, three bodels a baubee, four bodels eight pennies, six bodels one shilling Scotch.

August the 26th, we bad farewell to Scotland, and, after a journey of twenty-four miles, arrived at Carlisle, fording three rivers by the way, one at Annan, which, by reason of our ignorance, might have been a dangerous pass to us. Our host here told us that he used to be troubled with the stone, and the best remedy that he ever had experience of for to give him ease, was the decoction of *Geranium Robertianum*. Carlisle is low-built, scarce one fair house in it, poor, yet well walled about, and of good strength. It hath a large market-place, a castle, a citadel built of brick, but now ruinous, a guard-house in the market-place, lately built of stone, and a cathedral church, the body whereof hath been, since the civil wars, pulled down, the choir still standing. It is but a mean building, and poorly endowed; the top hath been indifferently well gilded, and the seats round the choir canopied with handsome carved work of wainscot. In a little chapel they showed us a tomb, which they said was St. Augustine's. They have preserved there two elephant's teeth fastened in a bone like a scalp, which they call the horns of the altar. On the backsides of the seats of the choir have been painted divers stories, with verses in old English, but now almost defaced. There is very good ground about this town, and such as for twenty years together will bear corn, without lying fallow. We ought here to remember Mr. Eglanby, who was very civil to us; there we saw the ancient inscription which Camden mentions. From Carlisle through Pereth, we went to Shap, in Westmoreland, where we saw the ruins of the abbey, very pleasantly situate in a private valley. The well, called by the vulgar the Annywell, that is reported to ebb and flow; upon the place some told us they had

observed it so to do; others, that though they had observed it daily for some years, yet they never could find any such thing, and therefore, if ever it did, yet certainly of lately years it hath ceased to ebb and flow. We found several rare plants growing about Shap in plenty, as *Ranunculus globosus* [*Trollius europaeus*, Linn.,] *Paralysis flo. rubro* [*Primula farinosa*, Linn.,] *Carduus mollis Helenij foliis P. B.* [*Saussurea alpina*, De Cand.,] *Sedi quædam species flore luteo* [*Saxifraga aizoides*, Linn.,] *Salix folio laureo P. B.* [*S. pentandra*, Linn.,] *Trachelium majus belgarum* [*Campanula latifolia*, Linn.,] *Geranij batrachoidis altera species* [*Geranium sylvaticum*, Linn.,] *Muscus clavatus abietiformis* [*Lycopodium Selago*, Linn.,] and many others.

August the 30th, we crossed the country to the spittle on Stanmore. By the way we saw at Appleby the castle belonging to the countess of Pembroke, who hath put it in good repair, as also the church and bridge. This lady hath a vast estate, which she spends partly in house-keeping and charitable uses, and partly in repairing and furnishing her castles, of which she hath six or seven in this country and Yorkshire, now in very good repair, and well furnished, viz., Appleby, Browham, Burgh, Pendragon, (about which she hath not a foot of land) and Skipton, &c.

ITINERARY III.

THURSDAY, May 8th, 1662, we* set out for St. Neots upon ascension day, where was held a great fair for sheep; thence through Swanford to Swinsted, a small village. Beyond Swinsted on the left hand, in the way to Northampton, we saw an house belonging to the earl of Bullingbroke, at a village called Melborn. We next passed through a very dirty town, the name of which we

* Mr. Willughby accompanied Mr. Ray in this journey.

did not enquire, and so leaving Yielding a little on the right hand, we came to Higham, passing by several little towns to Northampton. Upon the walls there, I saw growing *Saxifraga alba* [*S. granulata*, Linn.,] *Hypericum vulg.* [*Hypericum perforatum*, Linn.,] *Calamintha vulg.* [*C. officinalis*, Moench,] and *Cotyledon vulg.* [*C. umbilicus*, Linn.] From Northampton we rode through Hill Morton and Rugby to Coventry, thence to Coleshill, and then to Middleton. On a bank, by the way side, between Coventry and Coleshill, we found a kind of vetch, with a bright purple flower. We passed by Sir Clement Fisher's house, where is a bridge over the highway.

Monday May the 12th, we rode out to Sutton Cofield, where is a close called the park close, belonging to the free-school. Here we found *Lunaria minor* [*Botrychium lunaria*, Sw.] in great plenty.

Tuesday May the 13th, from Middleton to Stafford we passed on by the Trent side, where we observed great plenty of *Fumaria alba claviculata* [*F. claviculata*, Linn.;] all along by the way side, we saw that kind of fern which I first took notice of in Sussex. At Stafford town there is a fair market-place, and a good sessions house builded of free-stone, over the market-cross. Here is a hospital for twelve widows (a very pretty place) built by Martin Nowell in 1657. My lord Aston hath a good monument in the church at Stafford of his grandfather; he hath a good house called Tixhall, about three miles from Stafford. The great church called St. Mary's was formerly collegiate, and had three prebends. The town is governed by a mayor, eleven aldermen, and ten common-council men. At Riddesly is a new erected market. Mr. Weston hath a pretty house here.

Wednesday, May the 14th, we passed on to Nantwych, twenty-one miles. We diverted out of our way to see the puits [*Larus ridibundus*,] which we judged to be a sort of *Lari*, in a meer at Norbury, belonging to Col. Skrimshaw. They build altogether in an islet in the middle of a pool. Each hen layeth three or four eggs (of a dirty

blue or sea-green, spotted with black;) at the driving every year, they take commonly above an hundred dozen young, which they sell at five shillings the dozen. The colour of the puit is near that of a sea-mew, i. e. white and somewhat flecked, only the head is perfectly black; about the bigness of a teal or widgeon. They come to this meer the beginning of March, and are all gone by the latter end of July or before. They usually drive them about the 6th or 8th of June, sooner or later. They have sometimes divided, and part removed to another meer not far off, but this not often. At Derrington, three miles from Nantwych, Sir Henry Delves has a very fair house, and a large pool or meer near it by the road-side; and we saw among others, these gentlemen's houses by the way, viz., Sir Thomas Whitgrave's at Whitgrave, Mr. Cope's at Ranton Priory, Mr. Holland's at Adbaston. At Nantwych there is a fair church; the town is governed by ten constables; they have a custom like that in Scotland; when any one is dead, a bellman goeth about the streets the morning that the dead person is to be buried, tinkling a bell he has in his hand, and now and then makes a stand, and invites the people to come to the funeral at such an hour. From Nantwych to West Chester, by Beeston castle, twenty miles. By the way, at Bickly, we saw a pool in my Lord Cholmondeley's ground, which was made by the falling in of the earth about the year 1657, *Cujus historiam descripsit, D. F. W.** Beeston castle was strongly situate upon an high rock, but is now quite fallen down and ruined. We could not find any of those plants, which, in 'Phytol. Brit.' are mentioned to grow wild there, and suppose none such are to be found. By the way we observed, Sir Thomas Wilbraham's house at Woodhay, and Lord Cholmondeley's at Cholmondely, a very stately timber building. At Chester we were shown a fair altar with an inscription, which we copied, and which was dug up in the cellar of

* Dominus Franciscus Willughby, ut videtur.

the house at which we put up. The cathedral church is remarkable for nothing, except a preaching place or church in the south wing, and the bishop's seat (in the choir) of stone. It is built of a red washy stone, which suffers much by the weather. In the consistory lies the body of the earl of Derby, his grandfather, wrapped up in lead and not interred. Bishop Bridgeman hath a vault for a burying place in one of the isles of the choir. By the bridge gate there is a fair square water-tower lately built, which serves a great part of the city with water. The water is sucked up by suckers, like those of syringes, and stopped from running out again by valves, and forced up into pipes by the same syringe-stopples as the water is forced out of a syringe, and valves to stop it from descending. At the top of the cistern there is a pipe to let the air out of the pipes.

Friday, May the 16th, from Chester to Wrexham, and thence to the Molde, sixteen miles; by the way we saw a fair house of Sir John Trevor's at Gresford, and an house of Mr. Wynne's called the tower. Wrexham is a very fair market town, the church steeple exceeding handsome, adorned with statues cut in stone; a great number of poor people about the town, especially old women. There is at the Molde a large fair church of very good free-stone; therein is a stone pedestal and a canopy, where, they say, stood a living or quick image. It is the custom here, as in other places in Wales, to strew green herbs, as rushes, flags, branches of box and flowers, on the graves of dead persons for one year, and then to cover them with a stone. Near the Molde, in the way to Kilken, baron Edwards* has an house. At Kilken, the river Allen runs under ground for a little space. The channel is full of stones, which I supposed lay loose to some depth without earth, and the water runs under them. There is also a well which (they say) ebbs and flows in the winter time; but there was no such thing to be observed at the time of our being here.

* Baron of the Exchequer of Chester.

Saturday, May the 17th, we went on to Holywell, and so to Denbigh, where we stayed Sunday, May the 18th. This is one of the greatest towns of North Wales. We observed the sweet moss, and the stones spotted with red at Holywell. There hath been a large and strong castle at Denbigh, but now demolished. The town is governed by two aldermen and two bailiffs, the alderman chief. There is a good market-house, and above it a shire-hall, supported with stone pillars. In our journey from the Molde, we passed by the lady Mostyn's house at Kilken, Mr. John Mostyn's house at Potuary, Sir John Salisbury's house and park at Lleweny, near Denbigh. We saw also an house of Mr. Wynne's, and the bishop of St. Asaph's at Llandurnog. On a bushy hill near Denbigh, on the north-west side of the town, I found *Androsæmum campoclarense col.* [*Hypericum montanum*, Linn.,] *Lycopsis q.* [*Lithospermum purpuro-cæruleum*, Linn.] an elegant plant; besides a great many of such as I had elsewhere found, viz., *Tilia fœm.* [probably *T. parvifolia*, Ehrh.,] *Androsæmum vulg.* [*Hypericum androsæmum*, Linn.,] *Cardamine pumila bellidis fol.* [probably a mistake, as the plant so called is the *Arabis stricta*, Huds. found only near Bristol. The Denbigh station is not mentioned in Ray's 'Synopsis.'] *Pentaphyllum tormentillæ facie* [*Potentilla argentia*, Linn.]

Monday, May the 19th, we this day passed two villages, Henllan and Llanywith, and so through Bettus to Conway, and from thence to Bangor. On Penmaenmaur, I found *Lunaria minor* [*Botrychium Lunaria*, Sw.,] and a sort of *Sedum minus*. [?]

Tuesday, May the 20th, from Bangor we rode to Carnethllewelyn, which signifies Llewelyn's bones, a very high hill. We had not time enough to search the rocks, and so found no rare plants there, only *Cotyledon hirsuta* [*Saxifraga stellaris*, Linn.,] which grows plentifully also upon Snowdon hill. Bangor is a small mean town, the cathedral very indifferent, not comparable to some of our good parish churches in England.

We proceeded from Bangor to Beaumaris. At Penmaen, three or four miles distant from Beaumaris, towards Prestholm, mill-stones are digged up. An airy of falcons, at a place we did not set down the name of, near Holyhead. The teeth of the sheep are died yellow, that feed on an hill called Trysillum, where some have conjectured there are gold mines. At Llandwyn are the ruins of a church, which seems to have been a very fair one. From Penmaen-maur to Prestholm is a large paved caussey, visible at low water, and the ruins of an old castle still to be seen, at a very low spring-tide ebb, between the two Penmaens. There are fir trees digged up in the marshes here, and in Carnarvonshire. At a place called the Friery, about half a mile from Beaumaris, was found a stone coffin of one of king John's daughters, whereof they now make an hogs trough.*

Thursday, May the 22d, we went over to Prestholm island, in which we took notice of the ruins of St. Sirian's chapel; the tower is yet standing. There groweth *Hipposelinum* [*Smyrnium olusatorum*, Linn.] in great plenty. *Cochleria vulg.* [*C. anglica*, Linn.,] *Crithmum* [*C. maritimum*, Linn.,] *Beta marina* [*B. maritima*, Linn.,] and a small sort of *Geranium* [*Erodium maritimum*, Sw.,] which I had before observed in the Isle of Man. In the island (Prestholm) are bred several sorts of birds, two sorts of sea-gulls, cormorants, puffins, so called there, which I take to be *Anas arctica clusij*, razor-bills, and guillems, scrays two sorts, which are a kind of gull.

Saturday, May the 24th, we rode to Llandwyn, and thence to Carnarvon. At Llandwyn we found *Crithmum chrysanthemum* [*Inula crithmoides*, Linn.,] and *vulgare* [*Crithmum maritimum*, Linn.,] *Hyacinthus autumnalis minor*, [*Scilla verna*, Huds. is probably the plant meant by Ray,] *Limonium vulg.* [*Statice limonium*, Linn.,] and a kind of *Polypodium* [*Asplenium marinum*, Linn.] On

* It is commonly said, that the stone coffin in which was laid the corpse of Richard III after the battle of Bosworth-field, was afterwards used at an inn in Leicester as a watering-trough.—G. S.

the beaches near Abermennyferry in the isle, *Gnaphalium marinum* [*Diotis maritima*, Cass.,] and a kind of *Leucojum* [*Matthiola sinuata*, R. Br.,] both elegant plants. We found on the sea-shores, near Llandwyn, a pretty shell covered with prickles or bristles,* which the Welch call mermaids heads; abundance of them are thrown up there, all along the sands towards the *fretum*. Upon the coasts of Llandwyn are found a pretty small kind of *Conchæ venereæ striatæ;* on all the shores hereabout are cast up elegant small *Cochleæ* neatly coloured. We lodged at Carnarvon Saturday and Sunday, May the 24th and 25th. Here also I found that species of geranium [*Erodium maritimum*, Sw.] mentioned in Prestholm. Near Carnarvon remain still some ruins of an old town, which the Welch call Caer-Segon, i. e. Segontium of the ancients; there is a little chapel, with a well close by it, dedicated both to St. Elyn, as is also the river fast by, called the Saint's River; these are about a quarter of a mile south of the town. There is a chapel of ease in Carnarvon, close to the town wall; the parish church is half a mile out of town, whereabout old Segontium stood. We were told a legend of one St. Byno, who lived at Clenogvaur, and was wont to foot it four miles in the night to Llaynhayrne, and there, on a stone in the midst of a river, to say his prayers; whereon they show you still the prints of his knees; his man, out of curiosity, followed him once to the place, to see and observe what he did. The saint coming from his prayers and espying a man, not knowing who it was, prayed that if he came with a good intent, he might receive the good he came for, and might suffer no damage; but if he had any ill design, that some example might be shown upon him; whereupon presently there came forth wild beasts and tore him in pieces. Afterwards, the saint perceiving it was his own servant, was very sorry, gathering up his bones, and praying, he set bone to bone, and limb to

* Now well known to be the *Echinus*.

limb, and the man became whole again, only the part of the bone under the eyebrow was wanting; the saint, to supply that defect, applied the iron of his pike-staff to the place, and thence that village was called Llanvil-hayrne; but for a punishment to his man (after he had given him Llanvil-hayrne) he prayed (and obtained his prayer) that Clenogvaur bell might be heard as far as Llanvil-hayrne church yard, but upon stepping into the church it was to be heard no longer; this the people hereabout assert with much confidence, upon their own experience, to be true. This saint was a South Wales man, and when he died, the South Wales men contended with the Clenogvaur men for his body, and continued the contention till night; next morning there were two biers and two coffins there, and so the South Wales men carried one away, and the Clenogvaur men the other.

Monday, May the 26th, we went to Llanberis, and so to Bethkellert. By the way side, near the upper end of Llanberis pool, we saw growing wild, *Papaver erraticum luteum Cambro-britannicum* [*Meconopsis Cambrica*, Vig.,] and near the stone tower there, a species of *Orchis palmata* [*Orchis albida*, Sw., *Gymnadenia albida*, Rich.,] with an odorate flower like to *Monorchis*. We passed a very bad way, by two great pools of water. The Welch have a dish which they call Llumery, made of oatmeal, almost after the same manner of the amylum of the ancients.

In the lakes hereabout, viz., at Llanberris, Bettus, Festiniog, there is a fish taken called torgoch, [red-belly, the charr, *Salmo salvelinus*,] blackish upon the back, red under the belly, (*unde nomen*,) of which they tell some fabulous stories, as that three sons of the church brought them from Rome, and put them into three lakes, to wit, Llanberis, Llynumber, and Travennyn, into each two. They are taken in each lake but at one time of the year, and at a different time in the several lakes. At Llanberris they say that they are there taken only in the night, and that when it is not moonshine. An old man

at Bethkellert told me that *Meum* [*M. athamanticum*, Jacq.] grows upon Carnedwen, a mountain between Bala and Dolgelle.

Tuesday, May the 27th, we set out for Snowdon, and so to Clenog, about twelve miles. On Snowdon hill we found that species of *Adianthum floridum* [*Pteris crispa*, Linn., Sw., *Allosorus crispus*, Bernh.] which we had before observed in Westmorland. At Clenog we saw St. Bayno's tomb, whereupon (they say) if a sick person be laid for three weeks upon every Friday, after the third Friday he will suddenly either recover or die. Here is also a well dedicated to St. Bayno.

Wednesday, May the 28th, we travelled from Clenog to Aberdaren, eighteen miles. By the way we saw the rock at Madryn, where crystal stones are found. At Aberdaren, on the shores, grows the before-mentioned *Leucoium marinum* [*Matthiola sinuata*, R. Br.]

Thursday, May the 29th, from Aberdaren we ferried over to the Isle of Bardsey, a pretty little spot, rented for 50*l.* per annum. There build the Prestholm puffin, seapies, [oyster catcher,] and some other birds; and there are still to be seen the ruins of an old church; three more they told us of. Near these ruins is an heap of dead men's skulls, and other bones of such votaries, as, for the sanctity of the place, had been buried there. We found a kind of *Hyacinthus stellatus vernus* [*Scilla verna*, Huds.—See p. 168 supra.] growing there in great plenty; the same we conjecture grew at Llandwyn; we found also that species of geranium [*Erodium maritimum* Sw.] which we had seen in the Isle of Man, and in Prestholm; likewise the new *Polypodium* [*Asplenium marinum*, Linn.] on the rocks, which I find called by Lobel, *Chamæfilix marina Anglicana*.

Friday, May the 30th, we passed over from Aberdaren to Pulhely, and by the way saw a well which the Welch call Funnan Deuw, i. e. God's well. They fancy it works strange cures. We did not observe any notable taste in it, neither would it tincture silver, as we were told it would.

They have a tradition in Wales about the puffins, that they cannot fly if they be out of the sight of the sea-water; their wings are very small, and yet they fly swiftly, but seldom very high. Here we saw the sea-swallow, [common tern, *Sterna hirundo*,] which is of an ash colour on the back, white under the belly, hath a black head and a forked tail (*unde nomen.*) The bill, like that of the *Larus cinereus* [lesser black backed gull, *Larus fuscus.*] We saw another *Larus*, more black upon the back, and that had yellow legs.

Saturday, May the 31st, we rode to Harlech, passing two fords, sixteen miles. Here are yet standing the walls of an ancient and strong castle, built on an high rock close by the sands; also a great level, which they call the marsh, which has doubtless been formerly gained from the sea. Hereupon grows in plenty, *Juncus acutus maritimus sive capitulus Sorghi C.B.* [*Juncus acutus*, Linn.,] of which I suspect Phyt. Brit. makes three plants. This is a miserable poor town, yet is governed by a mayor, two bailiffs, and a recorder. Near Pen-morrun Sir John Owen has an house.

Monday, June the 2nd, we rode to Aberdovy, seventeen miles, over marsh land and sand. At Aberdovy lives the lady Lloyd, who informed me that *Rubia tinctorum* [*Rubia peregrina*, Linn.] was found growing wild on the rocks there by Dr. Bowles; but we had no time to search for it. I found a little sort of rushgrass upon the rock.

Tuesday, June the 3d, we travelled over the sands, and so came round about by Talabont, to the silver mills, and viewed the mint at Talabont, and took as exact a description as we could of the silver works.

Wednesday, June the 4th, we rode to the top of Plimllimmon Hill, and thence to Llanbadern, seventeen miles.

Thursday, June the 5th, we went on to Cardigan, where there is a priory near the church. By the way we saw the place where stood a castle called Christmas Castle, because it was begun to be built in the christmas holy-

days. On a common near Blaynport, lie a great many large stones; among the rest, one standing perpendicularly on one end in the ground, and another large one leaning upon it, and two others, one on each side the leaning stone; these stones they call king Arthur's quoits: under the leaning stone is a stone with little grooves upon it. These seem to have been some ancient monument of the Britons or Saxons, viz., a trophy for some victory, or stones reared upon some great person's corpse. The like stones we saw upon St. David's head; and they told us that, in other places of the mountains, the like were to be seen. We also passed by thereabout a bank, over which they throw the wooden ball that get the victory over other of the men of the high and low country of Cardigan. This contention and sport for the wooden ball is yearly on the Monday in Whitsun-week. We were told of a great stone in a plowed field, which hath this antient inscription, *Corbulensis hic jacet Ordous;* but this we saw not. Mr. Lewis hath a pretty house at Cardigan. Mr. Barry is owner of Cardigan Island. From Cardigan we rode to a poor village called Fishgard, where we were put to it for a lodging. Thence we proceeded to St. David's, where we viewed an old cathedral, therein divers ancient monuments, viz., that of the earl of Richmond, father of king Henry VII, in the choir. Owen Tudor's, and another of the Tudors, bishop Vaughan's, bishop Anselme's, &c. Behind the choir a handsome chapel of bishop Vaughan's, where sitting, he had windows so contrived into another chapel behind, called St. Mary's chapel, that he might see five masses said together, at five several altars. The steeple is taken into the choir, and the bell ropes hang down into it; and of the wings of the church are made chapels. The Welch have a proverb, that it is as good to go to St. David's twice, as to Rome once. There are also in this church the tomb of St. David, and one Wogan, a gentleman. This town is now a poor place; not far hence, on the sands, stood old Menew, whence the bishop is styled

Menevensis. At St. David's Head, among and upon the rocks, are found crystals or bastard diamonds, like to those found at Madryn and other places. Here lies a stone called the shaking stone, which they report formerly a man might have moved with his hand, (it is so poised on its centre,) though many men cannot move it from its place. I saw no great wonder in it. It is a rude stone, naturally made like to a meta, and standing upon its vertex. There I found the *Hyacinthus* [*Scilla verna*, Huds.] mentioned before in Bardsley, besides the plant which I call *Polypodium marinum* [*Asplenium marinum*, Linn.] growing on many rocks by the sea-side, which it is likely the herbarists may call *Felix marina*, or *Adianthum*, &c. Leaving St. David's, we rode that night to Haverford West, where we lay on Sunday. This is the largest and best town that I have yet seen in Wales; where was an old castle, now demolished. In the way hither we observed a tower called Roche Castle, which may be seen at a great distance. We passed by Ramsey Island, and the Bishop and his Clerks rocks in the sea near St. David's. Ramsey Island is so called, from *Ramsons* [*Allium ursinum*, Linn.] plentifully growing there. Here breed several species of birds, some the same as in Prestholm. We saw, at a distance, Scalme Isle, where wild thyme is said to grow, but we went not thither. At Haverford, near the river, are the ruins of an old religious house, which they call the priory; within less than a mile of the town is a fair house of Sir John Stepney's. In this town are three churches. South of the town, by a little river (which is kept up by banks to drive a mill) grows in great plenty *Cyperus*, &c. *q*. [*Scirpus maritimus*, Linn.] This is a town and county, governed by a mayor, alderman, sheriff, &c., and elects a burgess for the parliament. In a close near the castle, I found *Trifolium cochleatum folio cordato maculato* [*Medicago maculata*, Sibth.] From Haverford we rode to Pembroke, where we saw the ruins of the castle; in it, by the river's side, a large round vault in the rock, which sounds much; it

seems to be natural. Thence the same day to St. Gobin's Well, by the sea-side, where, under the cliff, stands a little chapel, sacred to that saint, and a little below it a well, famous for the cure of all diseases. There is, from the top of the cliff to the chapel, a descent of fifty-two steps. We proceeded to Tenby, a place strongly situate, and well walled. It hath a very pretty safe harbour, made by an artificial pier of stone. Great variety of fish taken near this town, viz., cod [*Morrhua vulgaris,*] ling [*Lota molva,*] mackrel [*Scomber scomber,*] thornback [*Raia clavata,*] soles [*Solea vulgaris,*] plaice [*Platessa vulgaris,*] turbot [*Rhombus maximus,*] scarbut, holybut [*Hippoglossus vulgaris,*] conger [*Conger vulgaris,*] hake [*Merlucius vulgaris,*] dog or hound-fish [*Scyllium canicula,*] horn-fish or sea-needles [*Belone vulgaris,*] haddocks [*Morrhua ægleſinus,*] gurnards, red [*Trigla cuculus,*] and white [*Trigla gurnardus,*] herrings [*Clupea harengus,*] sprats [*Clupea sprattus,*] mullet [*Mugil capito,*] and basse, [*Labrax lupus,*] suins [*Salmo eriox,*] sharks, dunhounds, bream [sea, *Pagellus centrodontus,*] flukes grey and white [flounders, *Platessa flesus,*] cowes, bleaks or pollacks [*Merlucius pollachius,*] ballon [*Wrasse, Labrus bergylta,*] smelts [Atherine, *Atherina presbyter,*] lobsters [*Astacus vulgaris,*] crabs, porpess, grampus, siels, hews, bullheads [*Cottus scorpius,*] butter-fish [*Gunnellus vulgaris,*] dots, bret or brit [brill, *Rhombus vulgaris,*] bowmen, oysters, shrimps [*Crangon vulgaris,*] limpings [limpets?] smooth and rough cockles, flemings, white and black hay-fish, cuttle-fish. We passed over to Caldey Isle, of which Mr. Williams is owner, and were civilly received there. In the island are three chapels, one at the abbey or priory, and two more. In a little island, between that and the main land, great plenty of fowl, the same that breed in Prestholm. In one part of this island the puits [*Larus ridibundus*] and gulls, and sea-swallows' [*Sterna hirundo*] nests lie so thick that a man can scarce walk but he must needs set his foot upon them. On the rocks thereabout groweth the *Malva arborea marina*

nostras [*Lavatera arborea*, Linn.] in great plenty, also *Crithmum chrysanthemum*, [*Inula crithmoides*, Linn.,] *Limonium vulgare* [*Statice limonium*, Linn.,] *Hyacinthus stellaris vernus pumilus* [*Scilla verna*, Huds.,] *Filix marina*, &c. [*Asplenium marinum*, Linn.,] and a kind of *Tithymalus* (*q. an Tith. marinus vulgaris?*) This island hath in it a small chapel, consecrated to St. Margaret, from whom also the island is denominated. On the sand there are found those small *Conchæ veneræ striatæ*, of which the country people make themselves hat-bands. The sea-swallows they there call spurs, and the razor-bills are called *Elegugs* [a name by which the common guillemot is still known in Pembrokeshire] about Tenby and St. Covin's. This name elegug some attribute to the puffin, and some to the guillem; indeed they know not themselves what they mean by this name. From Tenby we rode to Kidwelly, through Laughern, where we forded a river. There are standing the walls of a fair castle, belonging to Sir William Russell. After travelling on two miles farther, we saw them burning cockle-shells, thereof to make lime. The manner thus. They make an hole in the ground, therein they put furze, upon that wood, upon the wood small stone coal, and then a layer of cockle-shells, and so shells and coals, S.S.S.* and then put fire to them; these burnt, make excellent lime. Here are the ruins of an old castle belonging to the Lord Annesley. In this country they dig two sorts of coals, the one they call stone coal, not fit for smiths, the other ring coal, which is fit for their use. At Tenby they told us of a rock, which was lately anew discovered, six or seven leagues into the sea, remote from thence, whither of old the townsmen of Tenby were wont to repair for fishing, which did then much enrich the town, where there is excellent fishing. This rock, at low water, lies, in some places, not above seven or eight fathoms under water, it is supposed to be larger than Caldey Island; it lies in the center of a triangle, whose angles are Worms-head Point, Caldey Island, and Lundy.

* Stratum super stratum ut videtur.

Near Tenby Castle is a little island, which hath a chapel upon it, dedicated to St. Catharine; it is ascended by stone stairs cut out of the rock.

There is a castle at Kidwelly; the town is in a ruinous condition. On the sandy meadows near the town, I observed six sorts of rushes, among which that of *Harlech* [*Juncus acutus*, Linn.,] and *Juncus acutus maritimus* [*J. maritimus*, Linn.] Near Aberavon, on the sandy meadows by the sea-side, I saw growing, *Conyza helenitis foliis laciniatis* [*Cineraria palustris*, Linn.] A bird breeds there supposed to be the *Hamantopus magnitudine inter vanellum et gallinaginem minorem media* [Black-winged stilt? *Himantopus melanopterus*,] of a dark grey on the head and back, a light grey on the breast and under the belly, the five or six first feathers of the wing above of a dark or fuscous colour, near black, underneath more light or dunnish, the rest of the feathers party-coloured, the tops white, the bottom dark. The tail and feathers near it waved transversely with black and white lines, like the feathers of some turkeys, as likewise are the tips of some of the feathers of the wing above the remiges. The feathers upon the top of the back, between the shoulders and the tail, are some of them almost white, which, when the bird flies, represent a triangle of white. The bill of this bird is in figure like a snipe's, but not so long, *pro ratione*, by a great deal, of a dark red at the base, black toward the end; the legs long and red, the ungues black; it hath the posticus; these she stretches backward in flying, which make amends for the shortness of the tail; it makes a piping noise.

Friday, June the 13th, we proceeded on to Landaffe; by the way we saw a stone lying near Margam, near half a mile off, in the way to Newton, with this inscription, "PVMPEIVS CARANTORIVS;" whether or no there had been another line of letters was uncertain. At Newton we saw the well called St. John's Well, which ebbs and flows (as the people generally there affirm) quite contrary to the sea; but we found that it ebbed as the sea ebbed, and

do believe that it constantly does so. The water soaks through the sand (as I suppose) which lies in great plenty between the sea and the well. A story passes concerning salmons in the river Aberavon, that come up on Christmas-day, and may be handled, and then taken out at pleasure, and this is attested by all the country. *Credat qui cupit.* The church of Landaffe is indifferently fair, but wants the cross-building. You descend into it by steps; in it are divers monuments of the Matthews, and some bishops; on the bishop's seat is the picture of the Virgin Mary, supported by virgins, and a bishop praying, *Virgo scandens sis marshallus cœlum pendens.*

Saturday, June the 14th, we rode to Caerwent, an antient town, called of old Venta Silurum; a great part of the old walls are still standing, and the track of the rest perfectly discoverable. It hath been four-square. Here are digged up medals and Roman pavements. Here we met with an old gentleman (by name More) who hath a fair house at Creek. He told us of the salmons [*Salmo salar,*] in Uske and Wye, that are in season all the year round; for when they are out of season in one river, they are in season in another. Coals are dug up on both sides of the two rivers just mentioned, but not between them. We were told of an old man at Hereford, that eats neither fish, flesh (excepting the skin of a roasted pig), butter, cheese, or milk, nor ever did; his name Rod. Near Creek, in a bushet or wood on an hill, not far from the way-side, westward, grows *Vicia maxima sylvatica* [*Vicia Sylvatica,* Linn.] *fortè et erythrodanum,* [*Rubia peregrina,* Linn.,] besides many other common plants. The Bishop of Landaffe's palace is at Matherne. There are many castles in Glamorganshire and Monmouthshire. One at Cowbridge, which is a pretty walled town; one at Cardiffe, a large handsome town; one near Caerwent, called Calecut Castle, belonging to the king; another at Caerlion. We went from Creek to Chepstow, and from thence to Tintern Abbey, were we saw the wire-mills, and rode that night to Gloucester. By the way, near Tin-

tern, I found *Herba Paris* [*Paris quadrifolia*, Linn.,] and a kind of *Driopteris, q. an Driopt. Tragi?* [*Polypodium dryopteris*, Linn.] At Gloucester we saw the college. In the cathedral are twelve little chapels. The pillars in the body of the church are great and bulky, the steeple part of the choir, into which the bell-ropes hang down. Of the wings of the church are made chapels. We saw here many antient monuments. Robert de Courtois, in the midst of the choir in wood. Lucius, the first christian king, lies as it were on a shelf. Edward II, a Saxon king, that either founded or was a great benefactor to this church; also a fair monument of Sir Humphrey Bohun; another of Mr. Abraham Blackleech, who had been lately a great benefactor to this cathedral; likewise a monument of Major-general Crawford, a Scotchman, slain at the walls of Hereford, fighting for the parliament, and divers others. We exactly measured and surveyed the whispering-place, and took notice of the cloister, which is very large and handsome. We rode out to Lassington, where we found many of the star-stones. From Gloucester we went to Sodbury, and from thence to Alderly, where we found great plenty of the cockle and scallop-stones, but no *Cornua ammonis*. At Alderly, Judge Hales has an house.

Thursday, June the 19th, we got to Bristol, where we saw the cathedral. In it are a few antient monuments, one of Sir John Newton, who took the king of Morocco prisoner. Here are also the tombs of several religious knights, and of some bishops; one, of the first bishop of this church, who hath his mitre under his head like a pillow, and his ribs appear, that is, the bishop's effigies is cut in stone like a skeleton, or a body extremely emaciated. There is also the tomb of one Vaughan, a knight. We took notice of the bowling-green, and the plain about it by the river-side. We saw also Ratcliff church, built by one Cannings. It is in the form of a cathedral, arched with stone, well gilded on the roof. In the church-yard is a fair stone cross, whereat are preached four sermons

every year, to wit, on Good-Friday, Easter Sunday, Monday, and Tuesday. On St. Vincent's rock we found several plants, more than we had formerly taken notice of, viz., *Androsæmum campoclarense col.* [*Hypericum montanum*, Linn.,] *Ferrum equinam German. siliquis n summitate C. B.* [*Hippocrepis comosa*, Linn.,] *Acinos anglicum clus.* [*Calamintha acinos*, Linn.,] *Sedum medium* [*S. rupestre*, Linn. ?] *Filicis alia nova species, &c.* [*Ceterach officinarum*, Willd. ?] There is a walk in Bristol called the Tolsey, where are several brass posts or pillars given by several benefactors, serving only for ornament and to lean upon.

Friday, June the 20th, we left Bristol, and travelled to Bath. By the way we saw at Cainsham, a fine new built house of Sir Thomas Bridges; also the serpent-stones and star-stones found here. At Kelweston we saw a fair house of Lady Harrington's, and about a mile off at Coston, another of her son's. At Bath we took notice of no new thing, save bishop James Montague of Winchester his monument in the Abbey Church. We lodged this night at Paulton, a village seven miles from Bath, in the way to Wells. In the corn fields about Camerton, we found a kind of *Tithymalus* or *Esula* [*Euphorbia stricta*, Linn.,] which we had not before seen; we also here found a kind of *Tithymalus*, resembling, at first sight, the common sun-spurge, but it grows up to a great height, the leaves of a pale green or yellow like *Helioscop.* of the figure, well near, of wood spurge; the stalk sometimes reddish. We observed at St. David's, Gloucester, Ratcliffe church (and other churches) behind the choir, a large chapel dedicated to the Virgin Mary, which they call the Lady's Chapel.

Saturday, June the 21st, we rode to Wokey-hole, and from thence to Wells, where we viewed the church, which is a very neat one. It hath a double cross building; behind the choir is a large chapel dedicated to the Virgin Mary, wherein they have their service at six in the morning. The front of this church is very curiously

adorned with statues, and other carved work in stone; it has a pretty chapter-house and a large cloister, only it wants the fourth side. Here are two rows of houses, on each side of a long court (called Vicar's Close) for the singing men, whom they call vicars. In the church are the monuments of several bishops, particularly of Bishop Lake and Bishop Still; also of some priests and some abbots, which were transferred thither from Glastonbury. A large gravestone of Ina, a Saxon king, the first founder of the church; likewise the monument of one Harewell, a king's bastard. There are divers good pieces of carved work in this church. In the body of it, towards the west end, between two pillars in the wall, is carved the head of a king, with priests on each side tumbling headlong; also a bishop, with a woman on one side and a child on the other, of which they tell this story: the abbot who finished the body of the church after King Ina's death, when the workmen were building the church, gave them a plate out of his pocket which had these pictures on it, and bade them cut them in stone and set them in the church wall. When the abbot came and saw them finished he wept, and being asked the reason, he answered, when there should reign a king like to that head, and a bishop sit like the other, then friers and priests should be thrown down, and bishops marry. Now the king's face they report to be exactly like to King Henry VIII, and the bishop like the first married bishop of that diocese. Dean Crichton hath a fair house here, built by Doctor Burgess. From Wells we rode to Glastonbury, where once again I visited the Torr, which is nothing but the steeple of an ancient church, now quite fallen down and gone, as appears by the east side of the steeple, where the church had been broken from it, and by the testimony of ancient people thereabout, who have seen the vestigia and rudera of the walls. On the top of the Torr-hill, and all along the ascent, I observed great plenty of a kind of *Orobanche*, the stalk whereof is of a reddish purple colour, the flower one undivided tubus, like the flower of the common *Orobanche*, of a faint

purplish colour, with striæ or long lines all along the length of the flower, of a deeper purple. It hath some stamina, and a stylus, which ends in two, and sometimes in three, globuli. The root is like that of the ordinary *Orobanche*, in the lesser it more imitates a bulbe, and hath a few fibres or stringy roots at the bases or sedes of it; the root of the greater is oblong. [This plant requires examination; it may be *O. barbata.*] Upon the marsh, in the moist places, I observed creeping upon the ground a small umbelliferous plant, the leaf somewhat like to one sort of *Œnanthe;* the flowers very small, and consisting of five little white pointed leaves; the umbell, for the most part, had but two spokes of flowers, in some three, but this perhaps may be imputed to the poverty of the plant; the seeds striate, a little compressed, and but short; the stalk hollow, the root stringy. This is the water parsnip, though it may perhaps be referred to the *Œnanthe* [*Helosciadium inundatum*, Koch. ?] On the top of the hill, by the Torr, we found a kind of *Vicia*, with a long white flower [*Vicia hybrida*, Linn.] Likewise, in the meadows hereabout, we found in great plenty a kind of *Jacea*, in the leaf exactly like to the *nigra vulgaris*, in the flower to the *Jacea major segetum* [*Centaurea nigra*, with a row of marginal radiant florets. It is the plant noticed in Bab. Man. (p. 169,) as differing in some respects from the true *C. nigra* β. *radiata.*] We saw Joseph of Arimathea's tomb and chapel at the end of the church, also the abbot's kitchen, which is yet standing, all built of freestone, without any timber in it, at the bottom four square, and in each corner a chimney, and the top is cupola'd up with one round arch, like a chapter-house, and on the top a stone lanthorn, to convey away superfluous smoke. Mr. Stroud's barn, built all of freestone, with buttresses like a chapel, deserves to be remembered. The stump of the old Christmas thorn is now quite dead and gone, but they have several inoculated plants of it about the town. Mr. Pester, a merchant of Bristol, now owns the ruins of the Abbey of Glastonbury.

Monday, June the 23d, we went from Glastonbury to Taunton, twenty-one miles, and lodged at Wellington. Between Street and Walton (two villages in the way to Taunton) we found (in a close where they digged stone) a kind of trefoil, which I conjecture to be *Trifolium stellatum, C. B.* [*T. maritimum*, Huds.?] it hath an oblong head of seeds after the flower is gone (which is of a pale blush and fading) not unlike, for the figure, to the head of *Virga pastoris;* every particular seed-vessel ends in five radij, or points. Beyond Walton, in the way to Taunton, in a close by a stony lane, in the hedge, *Lithosperm. minus* [*L. officinale*, Linn.] In Somersetshire they have a way of setting their mows of corn on a frame (which they call a mowstead,) standing upon four stones cut with a shank, and upon that an head like a meta, resembling some toad-stools. Beyond Ling, and near Taunton, we passed by the Lord Hawley his house. Thereabouts, at a place called Orchard, lives Sir William Portman, one of the greatest heirs in England. Col. Sir Francis Popham hath the manor of Wellington, where there are the ruins of a once fair house of his, which had been garrisoned in the time of the late wars, and then demolished. Sir William Wyndham hath a large estate hereabout; but lives near Watchet.

Tuesday, June the 24th, we went from Wellington to St. Moulton, through Tiverton, a large borough town. Near Moulton we saw a fair house of Mr. Amery's.

Wednesday, June the 25th, we came to Buckland. We viewed Barnstaple, a very handsome and large town; but low built, yet the houses are all neat, and in good repair; the streets well paved; so that one may walk in them in slippers in the midst of winter. It is governed by a mayor and twenty-four aldermen, sends two burgesses to parliament, hath a good trade, is rich and populous; here is a pretty almshouse, and a long bridge of fifteen arches. We passed also Biddiford, which seems to be a thriving town, and to abound with shipping; here is also a long bridge of twenty-four arches. Between Westly and

Biddiford, all along the hedges on both sides the way, grows *Erythrodanum* [*Rubia peregrina*, Linn.] in great plenty, and no doubt also in the rocky ground all thereabout. Between Biddiford and Kilhampton, in the valleys, and near the rivulets and water courses among the moors, we met with *Campanula cymbalariæ foliis* [*Campanula hederacea*, Linn.,] and *Asphodelus Lancastrensis* [*Narthecium ossifragum*, Huds.] The river Ex rises not above five miles distant from the north or Severn Sea, and runs into the south or British Sea, giving denomination to many places, viz. Exford, Exmore, Exton, Exbridge, Exeter, and Exmouth. At Kilhampton, on the rocks, is a small sort of alga, broad and variously divided, and, as it were, curled at the top; besides *Corallina alba* and *rubra*. Nothing more frequent hereabout, in boggy and springy places, than *Asphodelus Lancastrensis* [*Narthecium ossifragum*, Huds.] and *Lysimachia galericulata minor* [*Scutellaria minor*, Linn.:] it hath a flesh-coloured flower, and the lip thereof is spotted with small red spots. Here also is a small sort of *Pinguicula* [*P. lusitanica*, Linn.;] which seems to differ specially from the common. It hath lesser leaves, crumpled up about the edges, almost pellucid, having red veins frequently, and manifestly visible. The flower is much smaller than that of the common *Pinguicula*, and paler, more of the flesh-colour [*Conferantur.*] The *Cotyledon palustris* flower [*Hydrocotyle vulgaris*, Linn.] also grows here; the stalks on which the flowers grow are small and low, bearing at the top five or six very small flesh-coloured flowers, consisting of five sharp-pointed leaves; (*exam.*) *vascula seminalia, sunt ea compressa, didyma, velut Thlaspeos cujusdam.* In Devonshire, as well as Cornwall, they mend or manure their land with sea-sand. In the east part of Devon they make the walls of their houses very thick, and of a red clay. In many of the towns the chimneys of the houses stand on the foreside towards the street, especially of the older houses.

Thursday, June the 26th, we set out for Launceston, twenty miles. There we saw the castle, which is well

delineated by Speed. This day we found, near Woodford Bridge, *Campanula cymbalariæ foliis* [*Campanula hederacea*, Linn. :] near Launceston, in a shady lane, are two species of *muscus* (q. osmund royal,) [*Osmunda regalis*, Linn.] grows in great plenty by the way sides; and near Houlsworthy (a mean market-town in Devonshire,) in the way to Launceston, we saw in the hedges great numbers of a kind of wild cherry-trees, with a long sharp-pointed leaf.

Friday, June the 27th, we passed on towards Padstow; but rode first to Tintagel, where we found Cornish diamonds on the rocks; but the fairest and largest are met with in the quarries, where they dig stone. Some there are, of the bigness and length of one's finger, very clear and pellucid; all of them have six sides, besides the ends. At Denbyboul, about two miles from Tintagel, is the best quarry of slate in the country; it lies east and west, and deepens westward. They slit it with chissels into thin laminæ: when it is first dug it slits easily, afterwards the sun hardens it so, that it will not slit at all. It is divided into several beds, both longways and broadways, by cracks or rifts, which they call junks; the outside of the slate, where the junks go, is commonly of a red colour. At St. Elyn's we passed one Mr. Matthews house, riding on to Padstow, where is as pretty a key as any I have seen. Mr. Prideaux has a seat here. This town is noted for strong beer. Great plenty of slate is dug up about this place, which they send into South Wales, and it is a good trade: they bring from thence pit-coal. Near Padstow we saw great flocks of Cornish choughs [red-legged crow, *Fregilus graculus*.] The gannets [*Sula alba*] they told us were almost of the bigness of a goose, white, the tips only of their wings black; they have a strange way of catching them, by tying a pilchard [*Clupea pilchardus*] to a board, and fastening it so that the bird may see it, who comes down with so great swiftness for his prey that he breaks his neck against the board.

Saturday, June the 28th, we travelled on to Truro, sixteen miles. By the way we passed St. Columb,* an old town. The churches in Cornwall, for the most part, have good tower-steeples of free-stone; the churches are made up of three rows or ridges of building, of an equal height, and sometimes length too, and covered with slate. Near St. Columb, by the way side, are found in several places, *Euphrasia pratensis lutea, C. B.*† Between St. Columb and St. Michael (and in several other places), a plant, which we guess to be *Alsine palustris minor serpilli folia.*‡ It hath long, weak trailing branches; the stalk is round and red, the leaves of a pale green, growing by pairs, the flowers grow *verticillatim* about the stalk, at every joint; each particular flower is compounded of five, as it were tubuli, in figure like the seed-vessel of lark-spur; it grows in watery places near springs. Nothing more common than *Osmunda regalis* about springs and rivulets in this country. Camomile [*Anthemis nobilis*, Linn.] grows in such plenty along the way sides, that one may scent it as one rides. Truro is a pretty town, the second in Cornwall, and is governed by a mayor and four aldermen, with their four assistants; the lord Roberts hath an house there, but it is a small one; the church is handsome and large, and hath two monuments in it, one of them of the three children of the Michells,

* Mr. Ray, in the year 1667, took another tour to the Land's-end, and from thence went to St. Columb. "By the way (saith he) at a place called Baldieu, we saw a tin mine. The load or vein, for the most part, runs east and west, and deepens north. The load is not a vein, but a floor or bed. The load, both above and beneath, is covered with a crust or stony substance, which hath no tin in it, which they call Country, the uppermost they call the North Country, the nethermost South Country. In the mine they sometimes find spar, which is nothing but a flour; some white and hexangular in diamonds. St. Columb is one of the best parsonages in Cornwall, the yearly value between 300 and 400 pounds."

† This is the *E. lutea*, Linn.; a plant not found in England, and therefore not included in Ray's 'Synopsis.' It is probable that the *Bartsia visosa, Trixago viscosa, R.* of Bab. Man. (*E. major lutea latifolia palustris*, Ray,) is the plant referred to in this place.—C. C. B.

‡ I believe that the *Illecebrum verticillatum*, Linn., is intended by this name, which is not to be found in Ray's 'Synopsis,' where the *Illecebrum* is called *Polygonum serpillifolium verticillatum.*—C. C. B.

the other of the present lord Roberts his grandfather. Here is an indifferent good key. About the key grows plentifully a kind of *Thlaspi* [*Lepidium ruderale*, Linn.,] which we are wont to call *Thlaspi minus fol. nasturtii hortens q.* They dredge up from the bottom of the sea abundance of a sort of white coral, among the sand wherewith they manure their land, and an infinite number of small turbines or buccinæ. I suppose the bottom of the sea is thereabout, where they take up this sand, all over covered with this coral. They find also on this coast the shells of the *Echini marini.*

Monday, June the 30th, we rode over the sands to St. Ives. There we saw a church almost quite covered with sand, blown up by the wind; the name is Uny Lalant. Here is a pretty little fortification which they call the castle. We saw also here some of the young murres, a bird black on the head and back, white under the breast and belly, and hath a black and sharp bill, black feet, whole footed. We were assured that the Cornish murre [*Alca torda*] is nothing else but the razor-bill. All along the cliffs, as we rode upon the sand toward St. Ives, grew *Fœniculum vulgare* [*Fœniculum officinale*, All.] in great plenty. St. Ives is a borough town, governed by a mayor and aldermen. There are a great many houses to the north of the town, which (as well as the church) are almost buried or overwhelmed with sand, blown up there by the wind in stormy weather. On a rock, a little above the town, to the north, stands a little chapel dedicated to St. Iva, as they say. The people of Britanny drive a great trade here for *Raiæ*, [different species of skate,] which they dry in the sun, and then carry away. In exchange for this, they bring salt. The inhabitants of this town are of opinion, that their fish are better and more daintily tasted than those taken about Pensance, or anywhere on the other side of the country, because theirs lie and feed upon the sand, and the others on ouze or mud. The fish taken about St. Ives, are salmon-peal, ling, codfish, mullet, bass,

hake (*sed rarius,*) bream and whiting, plaise, soles, turbot in plenty, as also gurnards, red and grey, mackrell, but not many, herrings, pilchards, and for this fish it is the best place in Cornwall; of these have been taken 1500 barrels in a day, some say 1800. Here are also taken lobsters, crabs, which they call pollacks [*Merlucius pollachius,*] dogfish dranicks (as they call them), tomlins [young codfish,] which are nothing but a young codfish, shads or schads [young sea bream,] dories [*Zeus faber,*] sand eels launces [*Ammodytes tobianus, A. lancea,*] &c. We passed over to Godreve Island, which is nothing but a rock, about one league distant from St. Ives, to the north-east near the land, upon which, in time of year, build great store of birds, viz., gulls, cormorants, razor-bills, guillems, [Guillemots, kiddaws,] and puffins. The razor-bills are not so numerous on this island as the guillems, or kiddaws, of which many scores of young ones lie dead here. Here they call the puffins, popes; and the guillems, kiddaws. We saw many of those birds which they call gannets, flying about on the water. This bird hath long wings, and a long neck, and flieth strongly. Possibly it may be the *Catarractes.* He preys upon pilchards [*Clupea pilchardus,*] the shoals whereof, great multitudes of these fowls constantly pursue. Another bird they told us of here, called wagell, [a name for the young of the great black-backed gull, but the habits here recorded are those of a *Lestris,*] which pursues and strikes at the small gull so long, till out of fear it mutes, and what it voids, the wagell follows, and greedily devours, catching it sometimes before it is fallen down to the water. This, several seamen affirmed themselves to have oftentimes seen.

Tuesday, July the 1st, we rode to the Land's End. Near St. Ives, in the way to Pensance, we found a kind of plant [*Sibthorpia europæa,* Linn.,] on a moist bank, whose leaf is somewhat like to *Saxifraga aurea;* it runs out in long wires like to *Campanula cymbalariæ fol.;* at each leaf it bears one small purplish-coloured flower. We

found another plant on a boggy ground, which had small grassy leaves, but very few; it was almost all stalk; it grew not above an hand high, had a yellow flower, but not open in any when we were there, it being a close day; the seed-vessel was somewhat large, *pro ratione*, round, biggest in the middle, smaller at both ends, like some rolls wherewith they roll corn. At the Land's End we saw nothing remarkable. Here they give names to some of the rocks; for instance, one they call the Long-ship,* another the Armed Knight, which they told us fell

* When Mr. Ray was the second time at the Land's-end, he made the following observations:—"August the 17th, 1667. On the rock called the Long Ship they often, in calm weather, find the *phocæ*, which they call soiles, sleeping, which sometimes they kill by striking cross the snout with a pole, and at others they shoot them. Some of them (they say) grow to the size of a bullock of two years old, and they are of divers colours. We could not certainly learn whether they have four or only two legs, and them before. One that said he had often killed them, affirmed them to have only two legs, and them before. We had also the story how they defended themselves, by casting stones backward upon those who came near them. Being shot dead, the male (they say) falls or sinks presently to the bottom, the female floats or swims. They distinguish here between sieles and soiles. The siele they affirm to be a much lesser fish, and not to be taken on our coasts. They distinguish also between dolphins and porpusses; and by their discourse I gather that a dolphin is a much lesser and scaly fish, and consequently what they call a dolphin is not the *Delphinus antiquorum*. Porpusses are here likewise taken in calm weather. We visited Dickan Gwyn (who lives in St. Just's parish,) and had from him some Cornish words. He is esteemed the most skilful man of any now living in the Cornish language; but being no good grammarian, we found him very deficient. Another there is, Pendarvis by name, who is said to be a scholar, who doubtless must needs have better skill in the tongue. Four towns there are in Cornwall where they coin tin, or mark it with the king's mark, *viz.*, Lestwithiel, Helston, Truro, and Pensance. Before it is thus coined it cannot be transported into foreign parts. Upon every hundred pound weight of tin the king hath four shillings. In the parish of St. Just are more tin mines wrought than in any other parish in Cornwall. One hundred of good fat ore yields almost so much black tin, and an hundred of black tin (when blown) about forty pound of white tin. A thousand weight of tin is sometimes worth forty-five pounds sterling, but since the war with the Dutch it is not worth above thirty or forty pounds the thousand at most. The tinners complain they lose by it. Before the king's return every man had liberty to sell his tin as well as he could to his best advantage, but since there has been a price set on it. There is made and uttered yearly in Cornwall four millions of tin, more or less. This information we had from Mr. Borlase, a young gentleman living in St. Just's parish, near the sea.

"August the 29th, at Pensance we saw a large tunny [*Thynnus vulgaris*,] which was taken in the pilchard nets. They call them Spanish mackrel. It

down about the time the king was beheaded; and a third they call the Spanish Lady, &c. Cornish diamonds are found hereabout, and indeed in all this country. Mr. Dickan Gwyn lives not far off, in St. Just's parish, who is the only man we could hear of that can now write the Cornish language. We met with none here but what could speak English; few of the children could speak Cornish; so that language is like, in a short time, to be quite lost.

St. Buryen, near the Land's End, is a deanery, which formerly Dr. Crichton had, now Dr. Weeks has it. There is a tower upon an hill, not far from the Land's End, which serves for a sea-mark. At Pensance we saw and described several sorts of fish, to wit, *Mullus major* [red mullet,] *Trachurus* [the weaver,] *Pagrus* [the braize,] *Erythrinus* [Spanish sea-bream,] hake, haddock, whistling-fish [three-bearded rockling,] rawlin, pollacks [*Merlucius pollachius*,] holibut, conger, and tub-fish [a gurnard,] which is no other than a red gurnard. We there saw the houses in which they lay (and the manner in which they press) their fish, especially pilchards, they pile them up on a bed of a great length and breadth, to wit, as long and broad as the house, made for that purpose, will permit, and breast high; then, in the wall behind, they have an hole into which they thrust a rafter or post of timber, (which reacheth cross the bed of

was about seven feet long and of a great bigness; his stomach was full of pilchards. We also saw the *Haliætus*, or bald buzzard, of a dark colour on the back, and white under the belly, having strong legs and talons so placed that she can bend two backward and two forward. The wings, when explicated in proportion to the body, are of a great length. This bird was shot, having a mullet in her talon. We likewise here saw the godwit, which they call a stone curlew, the same, I suppose, which is common upon our coasts in Suffolk. The colour differs somewhat from a bird of the same kind I was shown at Venice, which was more cinereous or dun, and had not that variety of colours in the wings and tail. At the Lizard Point, on the rocks, I observed *Herniaria glabra* [probably including *H. glabra*, Linn. and *H. ciliata*, Bab.] in great plenty; also *Asparagus vulgaris* [*A. officinalis*, Linn.,] and near the cliffs *Hyacinthus autumnalis minor* [*Scilla autumnalis*, Linn.] abundantly. On Goon Hilly Downs, near the Lizard Point, is a kind of heath [*Erica vagans*, Linn.] which I have not elsewhere seen in England."

fish) and on the other end of it hang one or two or more great stones, of which they have many lying there, with a great hook of iron fastened in them for that purpose; of these holes and rafters they have many all along the bed, which press down the boards, wherewith I conceive the bed of fish is covered, and so press the fish equally; underneath the bed they have a gutter to receive and convey the oil which comes from the fish, into a vessel made on purpose in the ground at one end of the house. They have a pretty key made with a pier of stones, both here and at St. Ives. On all the coasts hereabouts are cast up plenty of sea-laces [*Chorda filum*, Lamour.,] besides the sea-girdle and hangers [*Laminaria digitata*, Lamour.,] sea-belt [*Laminaria saccharina*, Lamour.,] &c. On the beach near Pensance, we saw growing many rare plants; to wit, *Gnaphalium marinum* [*Diotis maritima*, Cass.,] in plenty; a kind of sea-pease, species *Tithymali* [*Euphorbia peplis*, Linn.,] which runs close to the ground, the stalks of it red and round, the leaf green above, having only one middle rib or fibre visible, which is red underneath; the figure of it is oblong; but in those leaves among the seed it misses one corner, as if a snip were cut off from it. Near Penryn, along the hedges *copiose*, we found a kind of *Linaria* [*L. repens*, Ait.,] the same as I have in my garden, by the name of *Linaria Hungarica*. The leaves grow not in this confusedly upon the stalk, as in the common, but in rundles; it grows sometimes to be a yard high, the stalks brittle, much branched toward the top. The flowers grow not so thick and clustering together as in the common, but at greater distances, and are of a very pale blue, almost white, streaked all along the claw or heel with long blue striæ; the lower leaf hath a little appearance of yellow, but more within if you open it.

Wednesday, July the 2d, we went from Pensance to Penryn, through Market Jew and Helston. We saw, at a distance, St. Michael's Mount, a rock in the sea near the shore, to which one may pass on foot at low water;

there is on the top of it an house and chapel with a tower, where Mr. St. Aubyn lives; below is a pretty little key to receive small vessels. Penryn is one of the handsomest towns in Cornwall, situate upon an hill, excellently well watered, having water running in wooden pipes through the streets, and at intervals cisterns to receive it; and it is so contrived, that what overflows the cistern, runs into another wooden pipe, and so interchangeably down the hill; besides this, almost every house hath spring-water, a garden, and an orchard to itself. It is a borough, and hath a mayor and twelve aldermen. The mayor of Penryn uses to write himself mayor of Falmouth.

Thursday, July the 3d, we rode to a newly-erected town, which they have named Falmouth. The king hath lately made it a corporation. The country people round about call it Penny-come-quick, and tell this story of it. Within less than forty years there was here no house at all, but a certain person building a little one, a servant of one Mr. Pendarvis came and dwelt in it; upon which that gentleman bid his servant brew a little ale, and on such a day he promised to come with some gentlemen, and help her to some money by drinking it up. The servant obeyed her master's orders; but, in the mean time, a Dutch vessel came into the harbour, and the crew calling at the house, drank out all the ale. Mr. Pendarvis came with his friends at the day appointed, and calling for some drink, his servant told him she had none. Her master expostulating with her, she told him what had passed, and said, "truly master, the *penny came so quick*, I could not deny them." Thence had the town both its original and name. It is now become a great place, and belongs all to Sir Peter Killigrew, who is now building a church there. It consists chiefly of ale-houses, and depends upon the haven; the Dutch used much to frequent it. From Falmouth we passed three ferries, and rode to St. Michael upon Kevill, where we lodged one night. We saw there Mr. Boscawen's new house, the

best we had seen in Cornwall. In this parish did live the ancient family of the Carmino's, which is now extinct.

Friday, July the 4th, we set out for Bodmin; by the way we saw Roche Rock, of a great height, standing in the highest part of a large moor. Near the church of Roche, on the top of the rock, was a chapel dedicated to St. Mary, now ruined. There is nothing very remarkable in Bodmin, only a very large and fair church, with a spire-steeple, of which there are very few in Cornwall. The water which supplies the conduit (as Carew observes) runs through the church-yard. There are a great many tanners in this town. We did not see what Carew mentions of the kitchens and out-houses being up stairs, neither is the place held to be unhealthful, so far as we could learn.

Saturday, July the 5th, we travelled on to Saltash, and passed St. Neot's, and so went to the other half stone (so called) which hath an ancient inscription upon it, but is so weather-beaten that it is not legible. Upon the top of an high rock, about two miles north of St. Clere, are those stones which they call the Cheese-wring,* of which Speed hath given a figure. These seem to be naturally so piled one upon another, the least at the bottom; they lie askew and not perpendicularly. A little below, and nearer St. Clere, are the stones called the hurlers, which are oblong rude stones, pitched in the ground on one end, standing in three circles, the middlemost the greatest; their centers seem to be in one right line: about half a mile from these, on the downs, stands a stone called the Long-stone, more than two yards and an half high, having a cross on both sides of it.

We had an account of a hurling-play much used in Cornwall. There are two kinds of hurling, the in-hurling and the out-hurling. In the first there are chosen twenty or twenty-five of a side, and two goals are set up; then comes one with a small hard leather ball in his hand, and

* See Mr. Borlase's 'Antiquities of Cornwall.'

tosses it up in the midst between both parties; he that catches it endeavours to run with it to the furthermost goal; if he be stopped by one of the opposite side, he either saith I will stand, and wrestles with him, letting fall the ball by him, (which one of the opposite side must not take up, but one of his own,) or else throws the ball to one of his own side, (if any of them can catch it). He that is stopped may chuse whether he will wrestle, or throw away the ball; but it is more generous to wrestle. He that stops must answer, and wrestle it out. When any one wrestles, one of his side takes up the ball, and runs with it towards the goal, till he be stopped, and then, as before, he either wrestles or throws away the ball, so that there are commonly many pairs wrestling at once. An out-hurling is played by one parish against another, or eastern men against western, or Devonshire men against Cornish; the manner they enter it is as follows. Any one that can get leave of a justice, &c., goes into a market-town, with a little wooden ball in his hand, plated over with silver, and there proclaims the hurling, and mentions the time and place. They play in the same manner as in the other, only they make their churches their goals, that party which can cast the ball into, or upon a church, wins. In an out-hurling they have not a set number on each side, but each have as many as they can procure. An hurler, to help him in running, may catch hold on an horseman's stirrup. No horsemen play. Saltash is governed by a mayor and aldermen. On a woody bank (by a comb), to the south of Saltash, we first found *Lamium melissæ folio* [*Melittis melissophyllum*, Linn.] growing in great plenty. We observed no parks in Cornwall; their fences are for the most part earthen or stone walls; often, instead of a stile, you have only a gap in the wall, and a grate to pass over, after the manner of college grates, only ruder, and of wood or stone.

Monday, July the 7th, we went on to Plymouth, but by the way diverted to Stanehouse, a little town, not far

from the passage out of Cornwall. Thence we had a view of Mount Edgcumbe, a brave house, and well situate, belonging to Mr. Edgcumbe, a gentleman of great estate. On the hill which you ascend, after you are come over the passage to go to Plymouth, grows *Eryngium vulgare* [*E. campestre*, Linn.] in great plenty, which I do not remember to have seen any where else in England. There grows also *Erythrodanum* [*Rubia peregrina*, Linn.,] as upon almost all the rocks on the sea-coast hereabout. Here we had a view of the little island in the mouth of the river, called Portsea Island (as I remember), in which is a good fort. There are besides, three other castles near the entrance of the haven or key of Plymouth, on the west side of the town. Plymouth is a great and rich town, inferior in trade, riches, and bigness, to none in the west, except Bristol; yet there are no fair and uniform streets in it; here are two churches, one half built. This town makes a very fair show at a distance, as you go to Ouston, a good large town on the harbour, a mile to the east. From Plymouth we travelled on through Modberry, a little market-town, and so on to Morley. Near Modberry we passed a fair house belonging to Sir Thomas Hales.

Tuesday, July the 8th, we pursued our journey to Totness, through Dartmouth, a large and well built town, and hath a commodious harbour; at the mouth of it two castles, one called Kingsward Castle, from a little town on the other side of the water called Kingsward, the other St. Patrick's castle; there is besides another in the town. This town hath the river on one side, and on the rest it is compassed with steep, high hills. Many fish are taken in these parts. Pilchards we saw. Totness is a large, clean town, standing on the side of an hill; there is an old castle at the upper end of it, upon an artificial mount; and there are some rows of houses at the market-place, like those at Chester, with fair shambles. The town is governed by a mayor and fourteen aldermen, and is a borough. We went to Mr. Champerson's wood

to look for the *Melissa moldavica* [*Dracocephalum moldavicum*,—not a native of England,] but instead of it found *Melissa Fuchsi* [*Melittis melissophyllum*, Linn.] in plenty, which we suppose was mistaken for it. *Rubia major* grows also there. In Devonshire are abundance of deep, narrow, shady lanes; the country a very uneven one.

Wednesday, July the 9th, we passed on to Exeter. We viewed the town; it has one fair street; the houses well built; the cathedral is small but neat; it hath two steeples, one at each end of the cross building, in the one ten bells, in the other, one large one; the lady's chapel is converted into a library, and therein, at the upper end, a monument of Sir Peter Carey and his lady; there are other little chapels, and in them several ancient monuments, to wit, Sir Gaven Carew's and his lady's, and Sir Peter Carew's (Sir Gaven and his lady were poisoned); Bishop Stafford's, who was once chancellor of England; Mrs. Elizabeth Barret's, an herse cut in marble; Bishop Cotton's; Sir John Gilburne's and his lady's; Bishop Carey's; Bishop Branscombe's; Bishop Oldham's, in the wall (he was excommunicated); Bishop Stapleton's, and of his brother, a knight; Sir Thomas Speake's; one of another Sir Peter Carew, who died at Ross, in Ireland; Mr. Harbin's; Dean Lacy's, his effigies as naked, carved in stone, (he was found dead in his study); Bishop Marsham's; and one of Courtenay Earl of Devonshire; another of Bohun, Earl of Hereford; Bishop Lacy's, who built the chapter-house; and in the wall of one of the wings, a monument of Leofricus, the first bishop of Exeter. The cloister is pulled down, and there are now little houses, which the dean and chapter have given to poor ancient people to inhabit. The chapter-house is different from all that we have seen, an oblong, like a chapel, handsomely gilded on the top. A good area about the church.

Thursday, July the 10th, from Exeter we travelled through Honiton to Morley, twenty-one miles. We saw nothing remarkable in this day's journey.

Friday, July the 11th, we went on through Chard, six miles, to Crokehorn, seven miles; thence to Evil eight miles; and to Sherborne, four miles. Here the Lord Digby hath an house. The town is no inconsiderable one, the church large, arched, and well carved on the top. It was once an abbey church. Near the church is a free-school, founded by King Edward VI, and well endowed; the stipend is sixty pounds per annum. The castle is now ruined, but never was very great or strong.

Saturday, July the 12th, we set out from Sherborne to Salisbury, thirty-four miles, and passed through Shaftsbury, and by the Earl of Pembroke's seat at Wilton (about two miles from Sarum,) where is a park encompassed with a stone wall. Salisbury hath in it four parish churches, besides the cathedral. It hath water running through all the principal streets, which are straight and broad: it hath a fair and large market-place, and is governed by a mayor and twenty-four aldermen. The buildings are but low. The height of the cathedral steeple was lately found to be 135 yards, whereas before it was supposed to be 148, that is, equal to the length of the church; an octagonal stone upon the top of the spire twelve feet round. There are many monuments in this church, to wit, Bishop Poore's, who first began the building of the church, and continued it eleven years; Bishop Bingham's, the second founder's, who carried it on twenty years; Bishop York's the last, who finished it in eleven years more. A brass plate in the wall for Dean Gourdon, a Scot; Bishop Audley's tomb; Bishop Salcot's; Bishop Bridport's; Dr. Bennet's, who is reported, in imitation of our Saviour, to have endeavoured to have fasted forty days, but expired at seventeen days end; Dr. Sidenham's. A fair well-wrought free-stone monument for Sir Thomas Gorges and his lady. This monument is adorned with figures of the regular solids. A tomb for the Lord Hungerford, who was hanged and degraded, and had a toad put into his coat of arms; an iron twisted wire hangs up near his tomb, signifying an

halter. The like for the Lord Stourton, whose tomb is also here on the other side of the chapel of our lady. A monument of that family with six holes on one side, and six on the other, alluding (as his coat of arms) to six wells, three within his park and three without. The Lord Cheyney's tomb; Bishop Beauchamp's; Sir William Longspear's, Rosamond's son by King Henry II. A stately rich monument of the little Earl of Hertford; Dr. Wilton's, with a rebus on it, *will* and *tun;* Bishop Capon's; a monument of Sir Richard Mompesson and his lady, which is a gaudy one; Bishop Jewell, content with a gravestone. The cloister is wide, and a furlong about. The chapter-house is a large one, supported with a pillar in the middle, and hath fifty-two stalls in it for the fifty-two prebendaries of this church. About a mile from Salisbury, in the way to Amesbury, stood old Sarum: there are still remaining great trenches which encompassed the castle. They report that ancient Roman coins and urns have been dug up here.

Monday, July the 14th, we set forward to Amesbury, from whence I again visited Stone-henge, about a mile and an half west of the town. It consists of four rows of stones, the outmost high stones standing in a circle, and having stones lying upon them from stone to stone; each upright stone hath two tenons, which fill the mortices of the incumbent stones, and so they all together formed a circle. The stones within these are of a smaller size, and the inner ones are set in an hexagonal form, and are very large, two standing upright and pretty near together, having tenons, and one stone laid upon them with two mortices; together they represent the Greek letter Π. Six there are of these, standing like the latera of an hexagon, with a good void space between for the angles. We counted these stones, and found the number of all (small and great pieces and all) ninety-four. At Amesbury, in the wall of the abbey, we saw an old gravestone, supposed of Queen Guenever, King Arthur's wife; these remains are just behind the Marquis of Hertford's house,

in a little park. We here saw the loches [*Cobitis barbatula,*] which they take and drink down quick in a glass of wine. We also saw divers sorts of tobacco pipes, for which this town is famous. From hence we pursued our journey to Stockbridge, where we lodged.

Tuesday, July the 15th, we rode to Winchester, an old city. In it were fourteen churches; some of them are now fallen down, and the castle is in a ruinous condition. Here is one indifferent fair street. The town is governed by a mayor and aldermen. The shire-hall, within the castle, built like an old chapel, with a body supported by stone pillars, and in it are two isles. Over the court of Nisi Prius, above the judge's seat, is fixed against the wall, King Arthur's Round-table, with the names of the knights upon it. The cathedral is a large building, very plain without, a square low tower rising out of the middle of the choir. The pillars in the church are strong and large, the top of the body and of the side isles an arch of stone. A great ascent out of the body of the church into the choir, and two ascents more to the altar. The cross isles are about the middle of the choir. In this church are many monuments, to wit, William Rufus, his tomb-stone in the midst of the choir; his bones are in a chest of wood, which stands on the top of the septum which parts the choir and the side isles. Five chests more are set up in the same manner, one (as it is said) of a Queen Ina, having no inscription, the other four have inscriptions in ancient characters.

I.

Egbertus Rex obijt anno Domini 835.
Hic Rex Egbertus pausat cum Rege Kenulpho,
Nobis egregia munera uterque tulit.

II.

Adulphus Rex obijt 859.
Ringilshi in cista hac simul ossa jacent et Adulphi.
Ipsus fundator, hic benefactor erat.

III.

Edredus Rex obijt 955.
Hoc pius in tumulo Rex Edredus requiescit,
Qui has Britonum terras rexerat egregie.

IV.

Edmund Rex obijt A. D.——
Quem theca hæc retinet Edmundum suscipe, Christe,
Qui vivente patre regia septra tulit.

In this church are the following monuments: a tomb-stone on which is this inscription, "Intus est cor Nicolai, olim Wintonien. Episi. Cujus corpus est apud Waverly." This place is guessed to be now a corn-field, about a mile from Winton. A monument with this inscription, "Intus est corpus Richardi Willhelmi conquestoris filij et Beorniæ ducis." Bishop Fox's monument, with his effigies as a skeleton on it. He altered the roof of the choir, and was a great benefactor to the church; he lies buried under his chapel (which they call his study,) a little room behind the altar. Over this altar the inscription, "O sacrum Convivium, in quo Christus sumitur!" The roof of the choir over the altar is beautified with the History of the Passion, represented in carved work. In the space behind the choir are two stately monuments, one for Bishop Beaufort, who founded the hospital of St. Cross; another for Bishop Wainflete. Bishop Langton's chapel of curiously carved wood-work, and therein his tomb. King Lucius, his tomb-stone (as is supposed here;) Lord Weston's tomb, his statue in brass on it; Dean Mason's, who was also a knight. At the east end of this church is our lady's chapel (as it is there called,) in which they have their morning six o'clock prayers. King Philip and Queen Mary were married here, where Queen Mary's chair is still preserved. This chapel was built by two priors, Silksteed and Hunton; there are half rebus's for their names carved on the roof. Upon the wall behind the altar stood several statues of Saxon kings and bishops, who had been buried in that part of the church, with these inscriptions under them:— "Kenedelsus Rex," "S. Bitinus Epc." "Egbertus Rex," "Adulphus Rex," "Eluredus Rex, filius ejus," "Edwardus Rex sen." "Kinewaldus Rex," "Ethelstanus Rex, filius ejus," "$\overline{\text{SCA}}$ Maria, Dominus Jesus, Edredus

Rex," "Edgarus Rex," "Emma Regina," "Alwidus Epc." "Ethelredus Rex," "S̄C̄S̄ Edwardus Rex, filius ejus," "Cnutus Rex," "Hardecnutus Rex, filius ejus." Under the forementioned Saxon kings this distich:

"Copora Sanctorum sunt hic in pace sepulta,
Ex meritis quorum fulgent miracula multa."

King Hardeknute's tomb, whereon is this distich:

"Qui jacet hic regni sceptra tulit Hardecanutus,
Emmæ ac Cnutonis natus et ipse fuit."

On another tomb-stone these verses:

"Corpus Ethelmari cujus nunc Cor tenet istud
Saxum, Parisiis morte datur tumulo."

His heart is said to be found in an ewer. A monument of Stephen Gardiner's, his effigies like a skeleton.

Bishop Wickham (who founded the college here, and New-college in Oxford, both dedicated to St. Mary) is buried in a little chapel in the body of the church. There were verses about his tomb, which are now almost quite defaced;* there remains only as follows:

"Jugiter oretis tumulum quicunque videtis
Pro tantis meritis," &c. ——

Bishop Edington's monument. On either side of the entrance into the choir are the statues in brass of King James I and King Charles I. On a tomb-stone in the choir is this inscription:

"Præsulis egregij pausant hic membra Richardi
Fociuns, cui summi gaudia sunto poli."

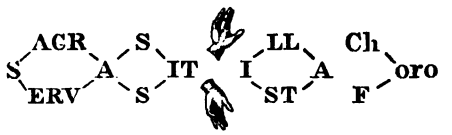
Here is also a monument of William de Basing, prior of this church.

The cloister is entirely pulled down. The following

* This tomb must have been repaired since Mr. Ray's time, as the learned Dr. Lowth, in his very ingenious 'Life of William of Wickham,' has given this epitaph complete.

verses are over a door by the church side, near another door into the church:

"Cessit communi proprium jam pergite quà fas."



The college is a pretty stone building, it hath a small well-adorned chapel, with a steeple, a cloister, and a library.

Wednesday, July the 16th, we proceeded on through Alresford, near which place we saw a large standing pool of water, frequented by divers sorts of fowl, as coots [*Fulica atra,*] ducks [*Anas boschus,*] &c. It belongs to Sir Thomas Tichborne. We lay at Alton.

Thursday, July the 17th, we rode through Farnham, where we saw the bishop of Winchester's stately palace, called Farnham Castle; we ended this day's journey at Windsor, a borough town, indifferently fair and large. Friday, July the 18th, we saw the castle, a large and stately structure, fit to be a king's palace; there are several courts in it. In the first, the poor knights, twenty-four in number, have their lodgings. At the west end of the castle is a tower, wherein are eight bells. St. George's chapel is a fair building, having a body and two side isles; it wants of the height of King's College Chapel in Cambridge, but the body alone is near as wide, arched on the roof with stone, as also are the side isles, and the two wings or cross building; the arch is very flat, and curiously adorned with carved work, in both which respects it is not inferior to King's College Chapel, and in the latter beyond it. In the middle of the roof of this chapel is the arms of King Edward III, surrounded with the arms of the knights, who were first created of the order. The seats in the choir are canopied over with good carved work of wood. The dean's seat is covered

with a canopy of velvet, and velvet curtains. Here the king sits when he comes to St. George's chapel. Every other seat is reserved for the knights companions of the order. In the backs of some of these seats are several brass plates with inscriptions on them, and some only have the coats of such as have been of the order, with the time of their installation. Over their seats are the banners of the present knights of the order. In the body of the choir were buried King Henry VIII, and King Charles I. In this chapel are the following tombs, to wit, one of the earl of Rutland, and his countess; another of Sir Thomas St. Lieger, and his lady, daughter of King Edward IV, and dutchess of Exeter. A tomb of the first earl of Worcester, and his lady; she lies on his right hand, because daughter to a king and queen, he being only son of a king. The tomb of Henry Wood, doctor of law, that of J. Dent, Esq., of Thornbury in Gloucestershire; William Fitz William's tomb, Sir Richard Wortley's, Dr. Thompson's, he was bishop of Gloucester, and dean of this chapel; by his tomb is his effigies, a skeleton well cut in stone. A monument, whereon formerly lay a bible, on which these words were inscribed, "Who laid this here? The reverend father in God, Richard Beauchamp, bishop of Salisbury, &c., vide." The rest intimates, that he who should read in that book, and look stedfastly on a stone cross carved in the roof, should have forty years' pardon. King Henry VI is buried here, without any other monument than his coat of arms on the roof, and a chain hanging on the necks of the two supporters, which are antelopes. A fair monument of the good earl of Lincoln and his countess. One Oliver King buried in his own little chapel, he was secretary to four kings, viz., Edward IV and V, Richard III, and Henry VII. It is so written under these kings' pictures on the wall. Charles Brandon, his atchievement hanging up. Here also lies a Lord Bray, who built a great part of this chapel; he caused a brake, wherewith hemp is dressed, to be wrought in the stone work, and

on the locks and keys, &c. Edward IV is buried here under a huge grave-stone, and over it a pair of gates of well carved steel of great value.

The poor knights wear a loose red gown over a purple gown at divine service, how at other times they are habited, I saw not; on their left shoulder is St. George's cross. The two silver candlesticks and basin on the altar, were given by the late Princess of Orange. Behind St. George's chapel is another chapel unfinished, where Cardinal Wolsey intended to have had his own monument. Out of the second court is a passage over a drawbridge, and through a great gateway, into that which they call properly the castle, which is the king's palace. Here stands the main-guard. Within the second court is a tower (called the round tower) standing upon a round and high hill, with a wide and deep ditch about it, where the magazine is kept. The third court is a very fair and spacious place, encompassed with very good buildings, on one side St. George's hall, where the king dines with the knights; also the king's private chapel. There are many fair rooms in the palace. The roofs of the guard-chamber and the presence-chamber are adorned with *speculums*, fixed in the corners of the fret-work. Along the north side of the castle is a very stately terras-walk, from whence is a view of the Thames.

In the hall is St. George's chair, on the back whereof is carved St. George killing the dragon, and the virgin standing by. In the lower-most room of a tower near St. George's hall, two kings were kept prisoners at once, viz., John king of France, and David king of Scotland.

From Windsor we passed a wooden bridge over the Thames to Eton. These two together make up a fair and large town. We saw the college, which is somewhat inferior to Winchester college. The chapel is large, and somewhat resembles king's college chapel in Cambridge. The outer chapel is used as the parish church of Eton. None sit in the choir but such as are of the foundation. Here is a little chapel of one Lupton, with a rebus carved

on it, to wit, *lup* and a *tun*. The monument of a Mr. Rous (late provost) which was here erected, was first defaced and afterwards taken down. Murray, tutor to King Charles I, lies buried, and hath a monument here. Sir Henry Savill buried here under a marble tomb; also Sir Henry Wootton under a marble, on which are his coat of arms, and this inscription,

"Hic jacet hujus sententiæ primus autor,
Disputandi pruritus fit ecclesiarum scabies.
Nomen aliàs quære."

The college of Eton is built of brick, hath a pretty little square court cloistered round about.

MR. RAY OF THE NUMBER OF PLANTS.*

To determine precisely what number of plants there are in the world, is a thing, if not absolutely, at least morally impossible, as we shall prove anon. But before we make any conjecture about their number, it will be requisite to debate these two questions. 1. Whether there have been or are yearly any new species produced besides what were at first created? 2. Whether there have been, or may be any species lost or destroyed? For if either of these be affirmed, in vain would it be to inquire the number of plants; it being uncertain and variable every year, and that possibly to a very great excess or defect. For the causes of these destructions and productions being accidental, there is no reason why one should exactly, or in any near proportion, balance and compensate the other.

Of the first question, those that hold the affirmative for proof of their opinion, alledge common experience; for doth not every new year afford us new sorts of flowers and fruits? and consequently new sorts of plants? Are not our gardens and orchards yearly enriched with new sorts, for example, of July flowers, tulips, and anemonies, of apples and pears? Do not our gardeners sell us these for distinct species? And do not herbarists generally enumerate and describe them as such? What herbal doth not make, for instance, *Caryophyllus*, or *Viola*,

* This paper appears to have been first published in the 'Philosophical Letters.'

Paralysis, with a double flower, different kinds from those with a single? I answer, it is true they do so; but if we examine and consider wherein their differences consist, we shall find reason to doubt whether they be specifically distinct or no; nay, rather to conclude, they are not. First, as for flowers. The main, if not only difference between these pretended new species and the old, we shall find to consist either in the colour of the flower, or the multiplicity of its leaves. Now that neither of these is sufficient to infer a specifical difference, is, I think, evident, unless we will admit that an European and an Ethiopian are two species of men, because one is black and the other white; or an European and an Indian, because the one hath a thick beard, and the other none at all, or but a few straggling hairs instead of it; the whole diversity being induced by the climate, or soil, or nourishment, as in other animals, is manifest. First, what effect the plenty and diversity of food, and different manner of living hath, appears in domestic animals, *ex. gr.* swine, ducks, geese, &c., which do frequently vary their colours; whereas the wild of those kinds retain constantly the same; and not their colours only, but the tastes of their flesh, it requiring no very critical palate to distinguish between the flesh of tame and wild beasts, or fowl. As for the colour, though wild animals taken and brought up tame do not usually themselves *in individuo* change their colours, but after two or three generations their breed; but sometimes they do, as I myself have seen a bull-finch, which kept in a cage, after some years, from the usual colour of that bird, turned to be coal black. 2. What influence the diversity of soil and climate hath upon divers animals as to the altering their colour, and other accidents, appears in divers instances. From the difference of climate, or constant inspection of snow, it proceeds that in the Alps and other high mountains, and also in those cold northern countries where the earth, for more than half the year, is continually covered with snow, there are found many animals white of those sorts,

which are usually and naturally of another colour; as for example, white bears, white foxes, white hares, white ravens, white blackbirds, and many others, as I myself have seen in Italy. That hares upon the Alps, and in the cold northern regions, do in the winter time change their colour to white, and in the summer again return to their usual and natural colour, though I find it delivered by good authors, and attested by credible persons, I dare not peremptorily assert; but that the influence of the soil and climate is great, appears farther in our Lancashire and Sussex beasts; of which the former have fair, large, and well-spread horns, the latter small and crooked; and if into Sussex you translate these cattle out of Lancashire, their race by degrees will degenerate, and come to the shape of the natives. So we see the horses in Flanders have large and hairy pasterns, which the English breed have not: and it is reported for a truth, that there is a pasture upon a hill called Haselbedge, in the Peak of Derbyshire, near little Hucklow, which will turn the hair of kine that feed thereupon to a grey colour in three years space. Now if diversity of soil, food, climate, or other external circumstances, breed such variety and difference among animals of the same species, much more then may it among plants, which are less free in the choice of their nourishment, and constantly affixed to the place where they chance to spring up.

Two ways there are of getting or producing these differences. First, by sowing the seed of that plant whereof you desire a new kind, in a rich soil, or in a soil different from its natural, or that where it grew before. So if you sow the seed (for example) of a single July flower in good ground, among many that bear single, it shall give you some roots that bear double flowers, and some of different colours from their mother plant, which you may propagate by the slip. The plants that are most apt to be thus diversified by sowing, are July

flowers; anemonies, lark-spurs, columbines, bears-ears, stocks, and wall-flowers, primroses and cowslips, crocuses, blewbottles, daisies, hepaticas, violets. And this is the usual, if not the only way, of getting double flowers of all sorts. Most red and purple flowers, and some yellow ones too, by sowing themselves in a garden, will give you some of white and different colours, as I found by my own experience in many, *v. g. Valeriana rubra, Dod.*, mothmullein, blewbottle, primrose, goats-rue, &c. Nay, in the fields we find scarce any red, purple, or blew-flowered plant, but one way or other it will vary, and come with a white or differently coloured flower. Plants that bear a yellow flower seldom vary in the fields. Secondly, the other way to diversify plants is by frequent removals. So Sir Hugh Platt tells us we may advance plants from single to be double-flowered, which seems probable; because plants, by long standing in one place, will by degrees degenerate, and become of double single-flowered, or turn from rare to common colours. But because my trials of this kind succeeded not to produce such an effect, and I never yet met with any intelligent and credible person who could attest it upon his own experience, I shall leave it to a farther examination.

But to return to our subject. That these varieties of plants we have been discoursing of are not to be accounted distinct species, but only accidental differences, may be farther confirmed, both because that if they stand long in the same place without culture, they will (as we hinted before) degenerate, losing the beauty of their colours, and of double becoming single; and also because that by the seed they will not propagate their species, but give you single plants, and of the common colour; I mean if they be sown in their proper natural place and soil. The only sure way to propagate them being by offsets from the root, if they be bulbous plants; or by slips and branches, if others. To this I might add, that from the same stem of a stock July flower I have some-

times seen some branches bearing double, others single flowers. By the by, let me note, that I have by experience found the vulgar mistaken in that opinion current among them, that the seed of those flowers which have more than the usual and just number of leaves, will produce plants bearing double flowers; for from the seed of the stock July flowers, succeeding flowers that were of five and six leaves apiece (whereas the usual number in that plant is but four) I had not one double-flowered plant sprung.

Secondly, as for fruit-trees, we may observe that the main difference between these pretended distinct species, consists in the figure and taste of the fruit, or pericarpium; which accidents are also wholly to be attributed to the difference of the soil, and the various ways of insition. For the means, and I suspect the only means, to get new fruits, is by sowing the seeds or kernels of apples and pears in good ground, which will give you wildings of a different figure and taste from their mother fruits, whose tastes may be mended and improved by insition. But that by insition new sorts of pears or apples (I mean different both as to figure, colour, magnitude and taste) may be produced, is to me scarce credible; because I have hitherto embraced for an universal and undoubted maxim, that *the fruit follows the cyon.*

As for plants of striped or variegated leaves, viz., gilded box, holly, alaternus, rosemary, bittersweet, mugwort, hyssop, mint, thyme, &c., there is less reason to allow them to be different species than either the forementioned flowers and fruits; because, that by several applications to the roots of those plants, they may be so altered from the ordinary colours; these marks being but the symptoms of a morbid constitution of the plant, induced by the foresaid applications. And, as we observed in flowers, the seed will give you a plant void of those marks, which are propagated in the slip or branch.

I am not ignorant that some do make the differences of great and little singly, to be sufficient notes whereon to ground a distinction of species. So in Parkinson and Gerard's 'Herbals', we find many plants put down for distinct species, which the authors themselves confess to differ in no other point than in being in all parts less the one than the other. Now though I grant there are certain bounds and measures of littleness, and greatness, which both plants and animals cannot exceed or fall short of; as for example, a sheep will never come to be so big as an elephant, nor so little as a mouse; nor a gooseberry-bush so tall as an oak, or so low and small as *Adianthum aureum minus*, when grown to its stature, be it in what country you please; yet is there a very great latitude in this particular between many plants of the same species, the difference of ten, nay twenty to one being only in magnitude; which difference is yet wholly to be imputed either to the richness or poverty of the soil, the moistness or drought of the season, the coldness or heat of the climate, or some other accident; which is evident in that if you take the seed of the smallest and poorest plant in its kind, provided it will admit culture, and sow it in a rich soil well watered, you shall soon get an offspring ten times as great as their mother plants. Nay, take a root of a perennial, and removable plant, from off a cold barren mountain, and plant it in a fat warm garden, and it shall attain twice the stature or dimensions it would have gotten had it remained in its native place. The like is observed in animals, we having here in England of sheep, from five to fifty pound a score; and of beasts, from three to twenty pound apiece. This is all I have to say to the first question.

The second question is, whether there have been, or may be, any species lost or destroyed? To which I answer, 1. That though it is absolutely and physically possible, yet it is highly improbable, that any species should be lost. 2. Though some species should be

destroyed, yet it is impossible morally that any man should be sure thereof. First I say that it is highly improbable, because that I can hardly persuade myself that there is any one local species of plants in the world; I mean so proper and peculiar to one individual place as not to be found elsewhere. I am indueed so to think, because I have not observed in England any one plant so proper to one place, but that I have found the same either beyond sea, or at least in several places of this island; and I doubt not but whatever grows naturally here may be found in divers places of the same latitude, or temper, beyond the seas. I am not ignorant that herbarists make sundry plants proper and particular to some one place. As for example, the balsam to Judæa, &c. But from these I must crave leave to dissent, till they have more than a negative argument to prove what they affirm. Yet supposing there be such local plants (unless you place them in islands that shall be wholly overwhelmed and swallowed up by the sea,) though they were at present utterly extirpated by the hand of man, or any accident, yet the seed, or at least seminal tinctures remaining in their original and native soil, when the present obstruction is removed, the earth will be apt to put forth the same plant again; so that if balsam were at first native of Judæa, and not imported from abroad, though it were all translated into Egypt, or elsewhere, I am persuaded the natural earth would have again produced it, unless the temper of it were much altered by some accidental or supernatural cause. Secondly, though some species should be destroyed, it is morally impossible that any man should be sure thereof. For first, no man can be sure that there is any one local plant in the world, unless either he himself hath visited every little spot of the whole earth, or have information from intelligent persons that know all plants, in all countries, both which are utterly impossible. But if there be no local plants, as I am confidently persuaded there are not, then

it is next to impossible that causes should concur to destroy any one species out of the world; or if they did, that any man in so vast a place as the earth is, so great a part of it also desart, or inhabited by barbarous nations who mind not these things, should ever get advice, or come to the knowledge of it.

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